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VIEWS, NEWS AND INTERVIEWS

Ray Stannard Baker tells for the first time the true story of Thomas A. Edison and the invention of the phonograph. Mr. Edison, who has grown very deaf of late, denies himself to most callers, and Mr. Baker was obliged to secure his interview through the medium of W. S. Mallory, the inventor's right-hand man, who went with him into Mr. Edison's private office. They found him in a characteristic attitude, his fingers thrust through his thick hair and his head leaning on his hand.

"Mr. Edison," shouted Mr. Mallory, "I heard an interesting story of your invention of the phonograph the other Sunday in Brooklyn. It was in church, and the preacher said that when you were a boy you had your ear one day to the ice and heard in the distance the sound of skates. He said that the idea first came to you that way."

Mr. Edison raised his head.

"Did a preacher say that?" he asked.

"Yes."

"Bosh! Now, I'll tell you how it happened. My model-makers all worked by the piece in those days, and when I wanted a model I always marked the price on it. In this case it was $8. I had the idea of the phonograph in my mind, and I drew my design and gave it to a workman named Kruesi, who finished it in thirty hours.

"Kruesi fitted the tinfoil on the cylinder and brought the machine to me. I turned the handle and recited:

"Mary had a little lamb,
Its fleece was white as snow;
And everywhere that Mary went
The lamb was sure to go.

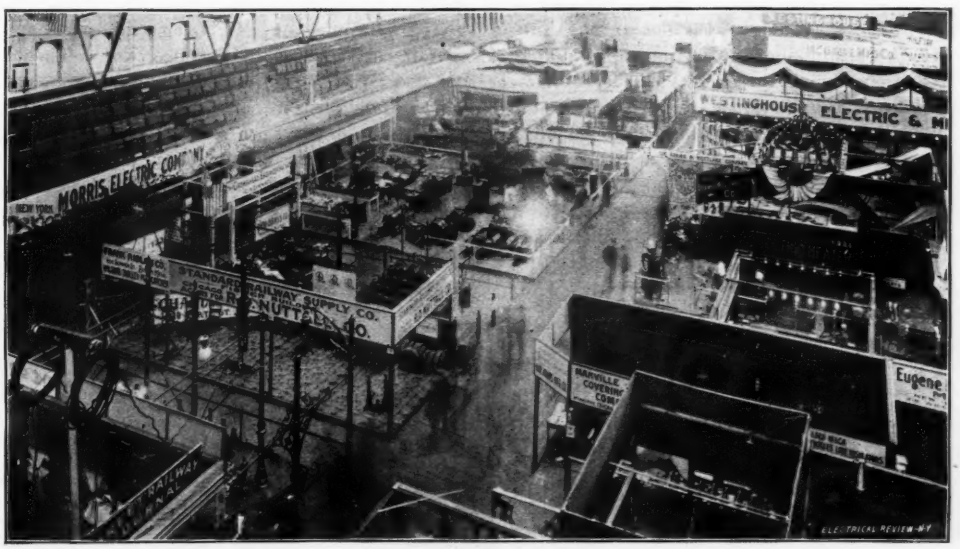
"Then I set the recorder back to the starting point and began to turn the cylinder. At the very best I had expected to hear nothing more than a buzzing confusion, but to my astonishment and awe, the machine began to repeat in a curious metallic voice:

"Mary had a little lamb,

"Thus, the first words ever spoken into the phonograph were these four simple lines of 'Mother Goose.'"

The idea of the phonograph had come to Mr. Edison with a flash of inspiration, and the machine proved its marvelous possibilities on the first trial. Few inventions have ever been conceived or carried out so successfully.

"Kruesi's $8 machine," added Mr. Baker, "which could not now be bought for hundreds of dollars, is preserved in the patent museum at South Kensington, England." — *Philadelphia Post.*



GENERAL VIEW OF EXHIBITION HALL, AMERICAN STREET RAILWAY ASSOCIATION'S CONVENTION, CHICAGO, OCTOBER 17-20, 1899.

One of the strangest defenses ever offered in a court is that made by the Edison Electric Illuminating Company of Paterson, N. J., in a suit against it, which is now on trial. The plaintiff is Berthold Frankel, a salesman, who alleges that during a storm he was struck by a falling arc light wire, in Broadway, and seriously injured. He was taken to the general hospital at the time and was a patient there for three months. It is admitted by all the physicians who have testified that he displayed all the symptoms which usually follow such a shock, but they deny that there was any burn on his body to indicate that he had been touched by a wire. The defense is that Frankel never came into contact with the wire at all, and that his illness after the supposed accident has been due entirely to hypnotic suggestion.

A press telegram from Richmond, Virginia, has a curious tale to tell. It appears that the Richmond Railway and Electric Company was haled before the police court to answer to the charge of violating the city ordinances in not maintaining a proper schedule of its cars. The company showed that one of its 550-horse-power generators had burned out, and by letters and telegrams proved that on account of the tremendous rush of orders at all factories making electrical equipment, it would be impossible to get a new generator inside of six months, and that it was with great difficulty that it could get material for repairs.

A few days ago long-distance telephone connections were completed between Detroit and Houston, Tex., a distance of 1,700 miles. The line is said to work clearly and with satisfaction for this distance.

Now they say that wireless telegraphy is produced by ether waves. Well, they are ether waves or something else.

TRACTION MEN.

THE STREET RAILWAY CONVENTION.

CLOSING SCENES OF THE EIGHTEENTH ANNUAL MEETING OF THE AMERICAN STREET RAILWAY ASSOCIATION IN CHICAGO—PAPERS AND DISCUSSIONS—AMUSEMENTS AND EXCURSIONS—NOTES.

WEDNESDAY'S PROCEEDINGS.

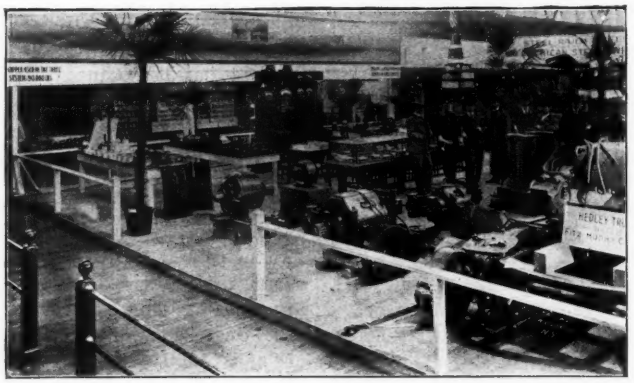
The session opened promptly, the Secretary announcing an invitation from the Siemens & Halske Company for delegates to visit its plant. The first paper upon the programme was entitled "Maintenance of Car Equipment," and was read by Mr. J. H. Van der Veer. This paper will be found in full in another column of this issue of the ELECTRICAL REVIEW. The discussion on the paper was opened by Mr. E. G. Connette, of Nashville, Tenn. He said that he had adopted the method used on steam railroads, and had every car cleaned and inspected and "tightened up" at night after the day's run was over. His experience for ten years' use of that method has been entirely satisfactory. About once in six months the motors were given a general overhauling. Mr. W. E. Harrington, of Camden, N. J., spoke interestingly of the piece-work system as applied to general repairs, carpenter work, painting, etc., on cars, and showed how a just schedule of prices for this class of work was established. The neighborhood of Camden is dusty and the cleaning of cars is a matter of serious importance with the company there. Its

work is done on the piece system also, eighteen-foot car bodies being swept, dusted and thoroughly washed for fifteen cents, and double-truck cars for twenty-two cents. The speaker thought that an interesting point would be the average percentage of cars laid up for repairs. On his road about ten per cent are kept in the shops. Mr. Van der Veer said that in Brooklyn the average runs all the way down from ten to four per cent. Mr. Harrington wanted to know what effect the use of single-motor equipments would have on this percentage. The discussion at this point drifted into the old argument of single versus double-motor equipments. Mr. E. C. Foster, of Lynn, Mass., said he had not found it profitable to operate single-motor cars. He believed in a plenty of power on a car, and quoted some figures showing excellent results attained with very powerful motor equipments. Mr. Harrington said that his experience was very similar, and that on his road single were being replaced by double-motor equipments. Mr. Connette said that he had found that on hilly roads the one-motor equipment requires less power. Mr. Douglass, of Cleveland, Ohio, thought that the question of single and double motors depended a good deal on the condition of the track. He also spoke of the low what the road could have done the work for itself. He spoke also on the double-motor car, and said that power was the cheapest thing that was supplied to an electric road. He believed in having a plenty of power, and was experimenting with four-motor outfits—one motor on each axle—which he had found to be exceedingly satisfactory. Mr. Connette said that he was not an advocate of single-motor equipments, but that where the streets are level the car thus equipped can be operated at less expense for power than the double-motor variety. The discussion continued along this line for some time, Messrs. Foster, Beggs, Connette and others taking part. Mr. A. E. Lang, of Toledo, a former president of the association, spoke about the maintenance of brass foundries. In Toledo he operates a street railway and an electric light plant combined, and maintains a brass foundry. He felt satisfied that it had proved an economical investment, and every brass fitting appertaining to a car is cast in this foundry.

In regard to the double-car equipment Mr. Lang thought it depended on local conditions with respect to grades. He spoke of an ingenious device for utilizing old short-car bodies. It had been a serious question what to do with four-wheeled cars that had been long in operation. He has taken two sixteen-foot bodies and spliced them together, putting the whole on double trucks, and had put them on heavily traveled lines in Toledo. While an expert could tell that they were not new cars the public was gratified and pleased with them. Replying to a question, Mr. Lang said that it cost about $300 to splice two old cars together and put them out as a new double-length car. Mr. Dimmock, of Council Bluffs, Iowa, said that five years ago his company did the same thing, and that in the five years the remade cars have required no repairs but painting. Mr. Beggs thought that it was not a good idea to splice old cars, as the cost of the makeshift, which is really old, is fully half that of a good new car. Mr. Dimmock said that he had used a steel trussed frame to strengthen the bottoms of his combined cars and that they had been very satisfactory. He had also successfully spliced open cars, and he felt that his company had gained money by the operation. Replying to a question of mileage of trolley wheels, Mr. Beggs said he got from 8,000 to 9,000 miles from his. Some roads, he believed, got as much as 17,000 miles. His policy was to use a soft wheel and wear out the wheels, not the wire.

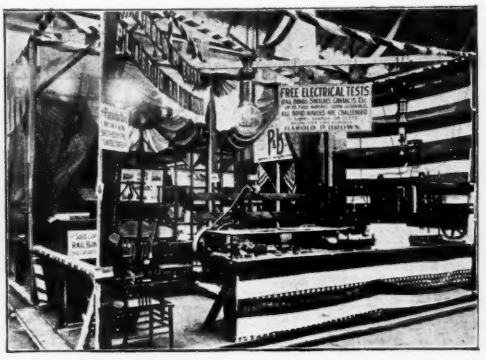
The paper of Mr. B. L. Kilgour, of Cincinnati, on "The Modern Street Railway Shop, Its Design, Machinery and Shop Practice," was called for, and Mr. Holmes, of Kansas City, announced that, as Mr. Kilgour expected to be married the next day, he had not prepared the paper, and he thought he should be forgiven for his remissness. The president called upon Mr. Knox, of Chicago, to start a discussion on this subject. Mr. Knox said that he had not been able to give the subject proper consideration, having only just been requested to speak upon it. There being no further discussion the Chair appointed the following committee to make nominations for officers for the ensuing year and determine upon a location for the next meeting: Messrs. H. C. Moore, Trenton, N. J.; E. C. Foster, Lynn, Mass.; E. G. Connette, Nashville, Tenn.; Robert McCulloch, Chicago, and A. E. Lang, Toledo, Ohio.

The Secretary announced that luncheon would be served on the special train taking the delegates to the drainage canal. This train left Dearborn street station at 1.30 o'clock, carrying a large contingent of members to inspect the vast engineering work which is intended to deflect the sewage of Chicago from Lake Michigan into the Mississippi River.

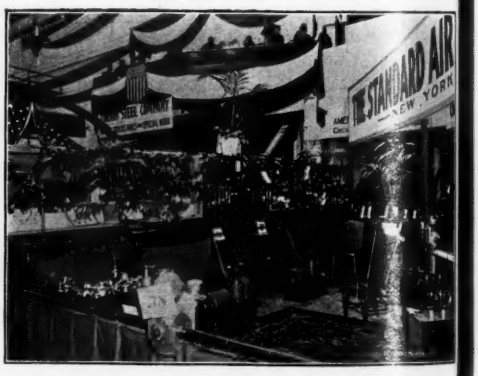


THE GENERAL ELECTRIC COMPANY'S STREET RAILWAY CONVENTION EXHIBIT.

HEADQUARTERS OF "ELECTRICAL REVIEW" AT THE STREET RAILWAY CONVENTION.



HAROLD P. BROWN'S STREET RAILWAY CONVENTION EXHIBIT.



THE STANDARD AIR-BRAKE COMPANY'S STREET RAILWAY CONVENTION EXHIBIT.

THURSDAY'S PROCEEDINGS.

The meeting was called to order by President Sergeant at 10.30 A. M. The Secretary read an invitation from the Westinghouse Electric and Manufacturing Company to visit the power house of the South Side Elevated Railroad.

The first paper was by Mr. Edward Butts, of the Metropolitan Street Railway Company, of Kansas City, on the "Construction and Maintenance of Street Railway Tracks."

This paper is reprinted in full elsewhere in this issue of the ELECTRICAL REVIEW. The discussion was opened by Mr. E C. Foster, of Lynn, Mass. He said that while the paper was a good specification for the building of girder rail track, it did not meet the cases where T-rail track is necessary; also that he preferred a construction having no wood in it and using only concrete under the rail. Mr. Holmes, of Kansas City, explained that the wooden blocks mentioned by Mr. Butts were not intended as part of the permanent structure, but were for alignment only. Mr. Foster said that the subject of cross-ties is one that is of much interest in the Eastern States, where over ninety per cent of the roads use them. He thought that for T-rail suburban construction, where high speeds are to be maintained, the same ties as used on steam railroads should be put down. He described a track now under construction in which material of the standard steam railroad type is being put in. He spoke also of girder rails on cross-ties and advocated ties at least seven feet long. Speaking of the problem of maintenance, he said that it became a question of perpetuating the heavy and expensive rails now in use. He spoke also of cast-welding and of the wisdom of its application to certain types of old tracks, which he doubted. Mr. Hawken, of Camden, Me., said that the question of ties was very important in New England. Replying to a question, Mr. Foster said that chestnut had given the best results in his experience as a material for ties. Mr. Keating, of Toronto, Ont., said the discussion raised the important question of the advisability of rigid construction. He had had success with rigid lines where the traffic was light. He wished to know if any observations had been made of the effect of rigid construction on the rolling stock in places where traffic is heavy. Mr. Butts, replying, said that he had had four years' experience with rigid tracks and found them very satisfactory. Messrs. Jones, of Memphis, Tenn.; Holmes, President Sergeant, W. W. Bean and Wason participated in the discussion, asking questions about the minutiæ of track laying in concrete. Mr. Wason said that he had had an unfortunate experience with cast-welded track in Cleveland, Ohio. The twelve-bolt fish plate had given him better service than the cast-welded joint. Mr. MacGregor, of Houston, Tex., asked what was the experience with a cast-welded track in unpaved streets. He also inquired about the bonding of cast-welded track. He suggested that street railways might be divided into two classes—those which have all the business they can handle and are seeking means properly to transport the public, and those which have little business and are striving for more. Mr. Heidelberg, of Chicago, invited the association to go and look at some track with cast-welded joints recently laid. It had proven very satisfactory in Chicago, he said. Mr. Heidelberg spoke of the importance of organization in maintenance of track. He said that good tools, good men and a thorough system were necessary for successful maintenance, and described the organization that he had perfected in Chicago. He explained the extreme importance of an almost military organization, especially in a Northern country where a snow-storm was liable to come on at short notice.

President Sergeant asked at this point to proceed with the report of the nominating committee. The report recommended Kansas City, Mo., as the next place of meeting, and the following gentlemen for officers of the association for the ensuing year:

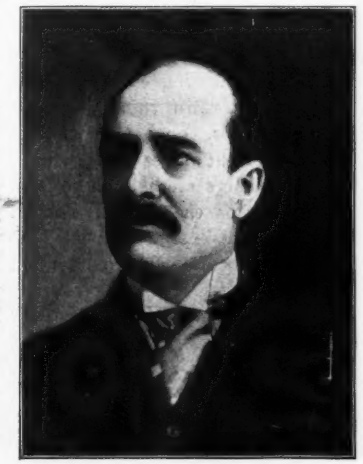
For president: John M. Roach, general manager Chicago Union Traction Company, Chicago, Ill.

For first vice-president: John A. Rigg, president Union Traction Company, Reading, Pa.

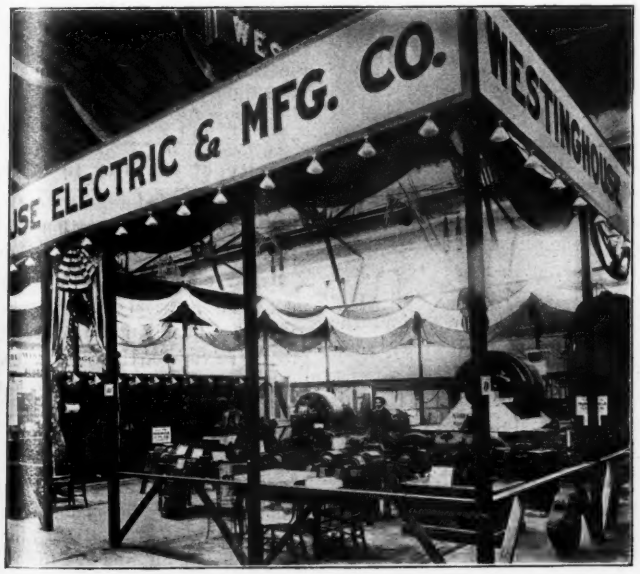
For second vice-president: H. H. Vreeland, president Metropolitan Street Railroad Company, New York city.

For third vice president: F. G.

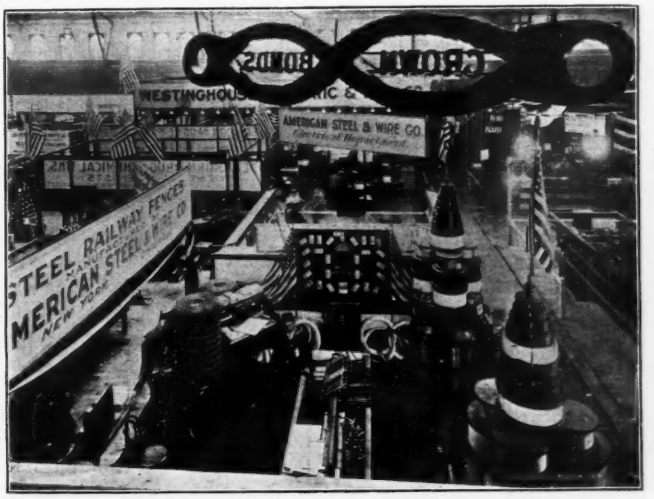
(Continued on page 271.)



MR. JOHN M. ROACH, OF CHICAGO, THE NEW PRESIDENT OF THE AMERICAN STREET RAILWAY ASSOCIATION.



THE WESTINGHOUSE ELECTRIC AND MANUFACTURING COMPANY'S STREET RAILWAY CONVENTION EXHIBIT.



THE AMERICAN STEEL AND WIRE COMPANY'S STREET RAILWAY CONVENTION EXHIBIT.

John Millard Roach.

The newly-elected president of the American Street Railway Association, Mr. John Millard Roach, has had an eventful and remarkably successful career. His ancestors came from Virginia in the westerly migration, settling in the garrison on the Muskingum River, near Beverly, Ohio, and Mr. Roach was born in Noble County, in that state, on January 30, 1851. At the age of eleven he went to Rockford, Illinois, where he had one year's schooling.

Moving further west he went to Corinne, Utah, and thence to Helena, Montana, covering the entire range of the Rocky Mountains and spending three years in that section of the country, prospecting for gold. On a "bucking cayuse" he rode to Walla Walla, Washington Territory; Portland, Oregon; Oakland, and down in the lower part of California, around White Pigeon, Utah, and back to Helena, Montana.

After roving about the western part of the continent, making and losing large sums of money, he returned to Rockford for a year and settled in the city of Chicago on October 7, 1872, entering the employ of the North Chicago Street Railroad Company as a conductor. He was an absolute stranger in the city and had no friends or acquaintances there. After serving the company as a conductor for four months he was taken into the office and made cashier. From that position he served in all the intermediate offices until, in 1889, he was made general manager of the North Chicago Street Railroad Company, and in 1897 general manager of the West Chicago Street Railway Company, in both of which positions he remains in the companies which have succeeded to the control of these properties.

Mr. Roach was married to Miss Katie E. Lyon in 1872, at Rockford, Ill., and has one son, Mr. F. Lyon Roach, born in 1875. Mr. Roach is a member of the Union League, Marquette and Union clubs of Chicago.

SCIENCE BREVITIES.

Automatic Pneumatic Switch for Accumulators—This device, due to E. Petersen, of Copenhagen, and described in a German contemporary, depends for its action on the fact that as a secondary cell is nearing the completion of its charge it gives off steadily increasing quantities of hydrogen and oxygen. The controlling cell of the battery is provided with an air-tight hood in which the gases are collected. A U-tube containing mercury communicates with the hood, and as the pressure of the gas increases the mercury is slowly driven up into the open limb of the tube. The mercury forms part of the main circuit, which it closes by means of two platinum contacts sealed into the tube. At a certain point the descending column of mercury leaves the platinum contact and breaks the charging circuit. Hitherto the arrangement has only been tried in the laboratory, with, it is said, satisfactory results.

A New Type of Bichromate Cell—A description of a form of bichromate cell in which the positive plate consists of a disk of carbon placed at the bottom of the cylindrical glass vessel containing the exciting liquid (12 parts bichromate of potash to 25 parts of concentrated sulphuric acid and 100 parts of water), the negative plate being a star-shaped block of cast zinc fixed at the center to the lid of the cell, is given by Herr W. Weiler in *Elektrotechnische Rundschau*. The carbon has joined to it a carbon rod passing to the top of the vessel with a metal terminal. The arrangement may conveniently be fitted up as a gravity cell, the vessel being partly filled up with a solution of common salt, and a mixture of one part of bichromate of potash crystals and two parts of potassium bisulphate crystals allowed to fall in through a tube passing to the bottom.

Dielectro-Magnetic Media—Signori Boccara and Pandolfi have recently studied what they call a "dielectro-magnetic medium" made of iron powder intimately mixed up with paraffin, and published their results in *Nuovo Cimento*. The iron used was chemically pure, and was suspended in the liquid paraffin as an impalpable powder. After cooling, perfectly homogeneous masses of dielectric were obtained, as shown by the uniformity in the density of different parts. When the percentage by weight of the iron in the mixture exceeds fifty the latter becomes conducting, and it was therefore necessary to confine the measurements of the inductivity or dielectric constant to percentages below that. The method adopted was that of the induction balance, with improvements on Gordon's arrangement. The balance consists of five disks of zinc four millimetres in thickness, with rounded edges, one of which is movable at right angles to its surface, while the others are held in position by three wires each. The second and fourth disks are connected to the quandrants of an electrometer, and the central one with the electrometer needle. The disk whose inductivity is to be determined is introduced between the first and second disk, and the first (zinc) disk is shifted until balance is obtained. The results obtained show that the inductivity increases more and more rapidly with the percentage of iron.

Pressure Due to Radiation—Various attempts have been made to determine the pressure to which the vanes of a radiometer are subjected owing to the radiation which impinges upon them. Schuster in one case found a pressure of 0.0294 dyne on a surface of 1 square centimetre, weighing 0.03 milligramme. Herr W. Donle describes, in *Wiedemann's Annalen*, some interesting results obtained by means of a bifilar balance. For a Hefner candle he obtained 7×10^{-5} dynes per square centimetre, for a stearine candle 12×10^{-5}, for an Argand burner 75×10^{-5}, and for a Welsbach burner 45×10^{-5}. Various bifilar arrangements were used, but the best was that in which a bar of aluminum 1 millimetre wide and 2 centimetres long was suspended by two cocoon fibres, and provided with a mica vane at one end and a glass counterpoise at the other. By a slight difference in the length of the two fibres it was ensured that the mirror attached to the bar always returned to the same zero. The results, especially at the higher vacua, are fairly in accordance with those of Crookes. An interesting question put was whether Roentgen rays produce any such pressure. In one experiment slight indications of pressure were obtained, but nothing definite could be concluded from them.

Electricity in India—Writing in the current issue of the *Nineteenth Century* Major Townshend refers to the fine iron ores which are available in enormous quantities in southern India, but which can not, at present, be developed owing to the inferior quality of the coal and its dearness in price. Many of the minor Indian waterfalls are practically empty except in the monsoon, so that a better form of accumulator than that at present known will have to be invented to store up enormous quantities of electrical power for considerable periods. Major Townshend believes that such an accumulator would have to be capable of storing up 60,000 horse-power a day for four months in the year, and giving it out all the year round at 20,000 horse-power a day. Until then the enormous power of the monsoons in India must run to waste. Electricity will also have to be carried over longer distances than now, and Captain de Lothbinière is now at Niagara with a view to solving the difficulty of utilizing the Seva Samundram Falls on the Cauvery to generate electricity for the Kolor Goldfields, a hundred miles distant. Southern and central India have splendid falls for the purpose, but in northern India only the running streams are available. It is very clear, however, that India presents a splendid field for electrical development in the near future.

Aluminum—A good deal has been written about aluminum lately in the foreign technical press. M. A. Ditte, in the *Annales de Chimie et de Physique*, states that an alloy of aluminum with about three per cent of copper when heated to dull redness and suddenly cooled becomes rough and crystalline and filled with minute cracks, which naturally hastens the destructive action of salt or acid solutions. Aluminum cooking vessels, he thinks, may be subject to this action. M. H. Moissan, in a note to the Académie des Sciences referring to the above experiment, lays stress on the great influence exerted by the purity of the metal upon its resistance to corrosion and upon the importance of excluding the possibility of electrolytic action to the contact of another metal with the aluminum. Reports from different officers of the French Army are quoted, speaking highly of the endurance of aluminum cooking utensils used for military purposes. Tinned or soldered vessels of iron suffer even more when heated to redness than those of aluminum. The author's personal experience of aluminum cooking utensils has been entirely favorable. In a subsequent communication to the Académie, M. Minet comments on the progress in the electro-metallurgy of the metal and the extraordinary improvement in the quality of the manufactured product. He gives as an illustration the following table:

Composition of the Metal.	In 1890.	In 1893	In 1897.
	Per cent.	Per cent.	Per cent.
Silicon	0.90	0.25	0.03
Iron	0.40	0.40	0.12
Aluminum	98.70	99.35	99.86

Telegraph Pole Protection.

In countries where there is a large average rainfall it is difficult to protect telegraph poles from rotting in the ground, which, in spite of the precautions taken to render the wood impermeable, they often do. In the *Moniteur Industriel* a system invented by M. Dubois is described, which is said to prolong the life of the poles very considerably. The system is very simple, and consists of surrounding the portion of the pole in the ground with an earthenware pipe, very similar to a small drain pipe. The end of this pipe comes just above the surrounding soil. Into the space between the pole and the pipe the inventor introduces a mixture of sand and resin. The resin is first melted, and poured into the pipe in that condition. When it solidifies, the sand and resin form an entirely watertight preventive against the butt of the pole rotting.

Scarcity of Paraffin in England.

A London contemporary of recent date says: "The prevailing scarcity of paraffin wax seems likely to become a matter of some seriousness to the makers of electrical conductors in this country. The importance is all the greater in view of the rapidly increasing demand for this product, the requirements now amounting to double the available supply. About one-half the supply of oil coming to this country is Russian and the other half American and Rangoon, but as paraffin wax can not be obtained from Russian oil, one has to look for a remedy for the present situation by endeavoring to cultivate the importation of American wax to this country. We are not aware what may be the difficulties, if any, standing in the way of such a development, but we should think it would be worth the while of American traders to give the matter attention."

A new steel shaft just finished for the Boston Elevated Railway Company is said to be the largest ever made. It is to be used in the company's central power station. The engine will be of 4,000 horse-power at ordinary speed. The shaft is 28 feet in length and 38 inches in diameter in the centre, and weighs about 75,000 pounds.

Wireless Telegraphy.

The London *Electrician*, in an editorial note, makes the following sensible comments upon telegraphing without wires, which are of especial interest at this juncture:

"Advocates of the Marconi system of wireless telegraphy—and they are many and increasing in number—will receive additional encouragement from the information embodied in Professor Fleming's letter in our issue this week. It appears beyond question that signals transmitted to Dover from Wimereux during the recent British Association meeting were detected at Chelmsford, the intervening distance being about 90 miles. Subsequent experiments made directly between Wimereux and Chelmsford have given abundant confirmation, for excellent signaling has been carried on between the two places.

"With the increased distance of transmission, however, the problem of restricting the signals to definite paths, so that they are received only at the proper stations, becomes increasingly pressing. While it is encouraging to know that the Wimereux station 'without any increase in the height of the Wimereux mast' can send signals to Chelmsford, there is food for serious reflection in the fact that those signals must, in the ordinary course, be received also at Dover, the East Goodwin lightship, the South Foreland station, and, indeed, every other wireless telegraph station within the radius of its influence. Evidently each increase in the number of stations thus brought into what may, perhaps, be termed group-influence must hamper the individual action and curtail the utility of each separate station in the group.

"Some time ago it was announced that Mr. Marconi was developing an apparatus whereby pairs of stations might be isolated from surrounding influences, and we believe that much labor and skill have been expended in the endeavor to perfect this modification in the details of the system. Nevertheless, we understand that such an apparatus is not generally in use in the group of stations to the southeast of this country; and we were informed during the British Association meeting that the method adopted was to send a special call to the station wanted, all the other stations receiving, but taking no notice. Moreover, the fact of the signals from Wimereux for Dover being detected at Chelmsford shows that they could not have been focused exclusively on Dover.

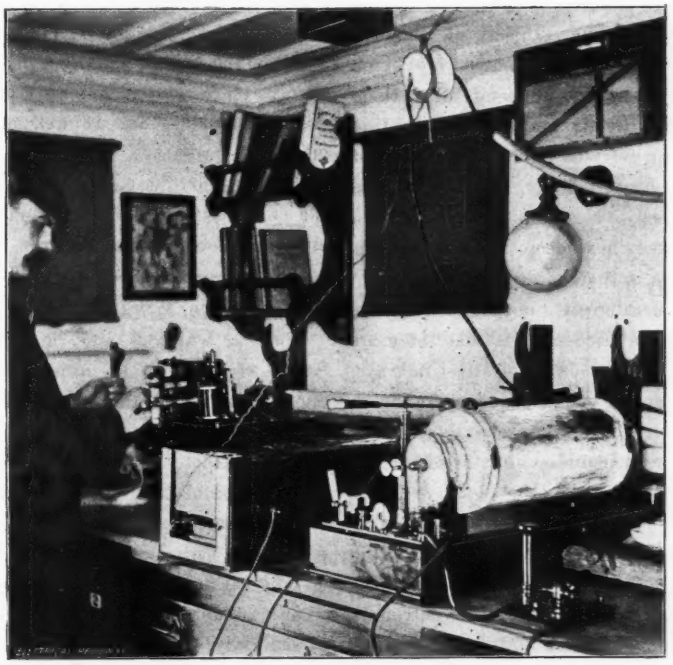
"Discouragement, however, need not result from the consideration that to extend the range of wireless signaling is to multiply its difficulties from interference. Although we know of no really satisfactory apparatus that would enable two stations in a scattered group of, say, 20 or more stations to signal exclusively, there are several well-understood principles that, with skillful development, might be applied to that end. The simplest method would seem to be that in which the ether waves would be cut off by metallic screens from every other direction than that straight to the desired goal. Another conceivable, but, as yet impracticable, plan would be to focus the rays by means of reflectors or refracting pitch lenses, after the manner of a searchlight. It is by no means certain, however, that Marconi waves once started on a well defined straight course would pursue 'the same straight line.' Most of the intervening objects of large dimensions, such as a hill or a large block of buildings, would probably exert an appreciable deviating influence.

"It is evident that much perfection of detail will be called for before extensive signaling at 500 or even 100 miles radius will be generally possible. Nor is it at such long ranges that the most useful work of the Marconi system will be accomplished, but at the much shorter ranges represented by signaling from lightships and islet lighthouses to the mainland, or between ships and the shore."

Marconi Instruments on the Cable-Ship Mackay-Bennett.

The illustration herewith shows the interior of the chart-house of the cable-ship Mackay-Bennett during the reception of bulletins by the Marconi system of wireless telegraphy on the occasion of the recent international yacht races. The apparatus shown comprise both the receiving and sending mechanism.

Hanging from the ceiling is a large porcelain insulator holding the end of the wire which goes to the mast-head and serves as a path for the surging currents in sending, and to gather the minute electrical disturbances in its vicinity in receiving. The upper end of this wire is insulated by a length of rubber hose, and it hangs free in the air until it enters the chart-house.



MARCONI APPARATUS ON CABLE-SHIP MACKAY-BENNETT—PHOTOGRAPHED BY MR. CREED.

The lower end of this wire, which is a flexible insulated copper cable of about No. 10 gauge, is connected to one knob of the 10-inch induction coil seen on the table. The other knob is connected to a wire which is grounded on the hull of the ship.

At the extreme right is the sending key. A rocking lever with two contacts, one of which is kept normally closed by a spring, and a high hard-rubber handle for manipulating it comprise this instrument, which is so well shown in the illustration as to require no further description. It is connected in the primary circuit of the induction coil, storage batteries being used to furnish the requisite energy.

Upon depressing the key a shower of sparks bursts between the knobs of the coil, which are separated from one-half to one inch, and continues as long as the key is held down.

The receiving apparatus is at the left. In the square sheet-iron box is the coherer, tapper and other instruments, the nature of which has not yet been made public. These are connected in a local circuit with a battery and the Morse inker seen at the extreme left. This instrument is of the ordinary British post office pattern and prints its records on a tape. Mr. T. Bowden, one of Mr. Marconi's staff of electricians, is seen in the illustration reading a tape message.

During the races the apparatus worked easily and well, signals being exchanged with the vessels Ponce and Grande Duchesse, similarly equipped, and a station ashore on Atlantic Highlands. The Mackay-Bennett was anchored near the starting point while the other vessels followed the contesting yachts. The extreme distance at which messages were exchanged during the races was the limit of the course—15 miles.

Development of Wireless Telegraphy.

It is reported that an attempt will shortly be made to connect Havana and Key West by the Marconi system of wireless telegraphy.

Superintendent H. S. Pritchett, of the United States Geodetic Survey, announces that he will make a new and somewhat novel use of wireless telegraphy. Next season the United States ship Pathfinder will be sent to Alaskan waters to survey the islands of the Aleutian group, near the Unimak Pass. The islands, Mr. Pritchett says, have not been correctly located on government charts and maps. The Pathfinder was built a year ago, and equipped with the latest appliances and instruments, including apparatus for the wireless system of telegraphy. Several islands of the Aleutian group lying between fifteen and twenty miles apart, near Unimak Pass, have been selected as a field for the use of wireless telegraphy. By this means the difference in latitude of the islands will be determined with accuracy.

Bicycles Are Not Baggage.

Bicycles are not baggage, so declare the three judges of the St. Louis Circuit Court of Appeals. The baggageman of a Missouri Pacific train refused to receive a bicycle in his car. The owner brought suit for mandamus to compel the company to carry his vehicle under the same provisions as those for ordinary baggage, and was successful in the Circuit Court. The company appealed and its practice has been sustained.

Electrical Review

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CHARLES W. PRICE, - - - - - - - EDITOR.
STEPHEN L. COLES, - - - MANAGING EDITOR.
CHARLES T. CHILD, - - - TECHNICAL EDITOR.
STEPHEN H. GODDARD, ADVERTISING MANAGER.

REGISTERED CABLE ADDRESS:
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NEW YORK OFFICE:
RUSSELL HOWLAND, GENERAL REPRESENTATIVE,
Times Building, 41 Park Row.

WESTERN OFFICE:
FRANK E. COLBERT, REPRESENTATIVE,
935 Old Colony Building, Chicago.

WASHINGTON OFFICE:
GEO. C. MAYNARD, - REPRESENTATIVE,
Room 102, Washington Loan and Trust Building,
WASHINGTON, D. C.

LONDON OFFICE:
HENRY W. HALL, - - REPRESENTATIVE,
42 Old Broad Street, LONDON, E. C.
News, Subscriptions and Advertisements.

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CHANGES for advertisements must be in this office by Friday noon for the following week's issue.
NEW ADVERTISEMENTS should be in the office not later than Saturday noon to insure publication the following week, although it is occasionally possible to get in matter received on Monday.

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THE STREET RAILWAY CONVENTION.

It has been the rule, since the formation of the American Street Railway Association eighteen years ago, for each annual meeting to surpass in interest and value all its predecessors. This year's gathering was no exception; it was the most businesslike and useful meeting the Association has ever had.

As has been mentioned in these columns, there was no paper on the programme of a purely electrical nature. The subjects of the few papers that were presented were chosen with excellent judgment, all of them being directly practical and treating of the every-day working problems of the street railway. The long and general discussions following them showed how deep an interest was taken in their subject matter.

An interesting development of one of these discussions is that there are two definite classes of street railways, presenting conditions of operation so different that there is hardly anything of profit or interest for the one in the methods of the other. These classes were defined as the big roads having all the traffic they wish and often more than they can handle, and the little roads having less patronage than they need and seeking more. The great systems in our larger cities have become a class to themselves, and, operating under unique conditions, they offer unique problems to both engineer and financier. The growth of these systems has been astonishing and phenomenal. In New York city last year one system carried more than two-thirds as many passengers as the combined steam railroads of the United States, an unthinkable number of people, equivalent to about five times the population of the country, who paid nearly eighteen million dollars in fares. And this was on one system, operating in one borough of the city, with active competition against it.

People in whose ears still echoes the jingle of the car-horse bells of yesterday find it hard to realize the vastness of this industry which has sprung up in a decade. Not only are there these gigantic systems representing enormous aggregates of investment and having revenues like those of a little empire, but there are as well a great and growing number of small lines, probably representing in the aggregate more investment and larger income than the metropolitan systems. The future of the electric railway can be seen but dimly even now, and it is not unlikely that its present development, vast as it now seems, will be overshadowed by the growth of these lines in another decade.

Hence the Street Railway Convention is representative not only of a mighty industry, but as well of a marvelous progress; it gathers together in their finest exemplification the two vital forces that go to make civilization—capital and brains.

WIRELESS TELEGRAPHY IN WAR.

The war which is now raging in South Africa offers an unparalleled opportunity for a thorough test of wireless telegraphy as applied to military purposes. The country that is the scene of this conflict consists for the most part of arid, treeless plains with here and there stony hills of no great height, and offers almost as uninterrupted a surface over which to send wave signals as does the sea. The character of the warfare itself, according to all reports, is such that it will be exceedingly difficult, if not impossible, to maintain telegraph lines of communication. It is to be hoped that the British War Office will seize the opportunity that is before it, and avail itself of what can not fail to be a useful auxiliary in maintaining its communications.

The many vexed questions as to the necessity for delicate adjustment, the tenderness and fragility of the apparatus, the mutual interference of signals from various places, could be finally settled by a thorough service test. It is hardly probable that the South African war will last long enough to permit any very extensive series of experiments with wireless systems, but the simplicity of the apparatus employed is so great and it is so easy to get most of its parts in the open market that it will take but little time to install a number of working stations even in far-off Africa.

Argument as to the value of this system in war is useless in the face of conditions which permit its test.

It has not been often of late that American manufacturers have been embarrassed by an overwhelming rush of work, but that this is the case at present no one who reads the newspapers can doubt. From all sides come the wails of those who can not get what they want and those who can not make what they would like to. It is not a doleful wailing, but rather a sound of happiness. There has never been before in the United States such widespread prosperity in all lines of work. Factories are running day and night everywhere, and the only fear of the farmers in the northwest is that their magnificent crops may not be gathered for lack of men to do the work. This prosperity has also descended upon the electrical industries. The rush of orders has completely swamped many manufacturers, and this situation has worked some real hardship, it being impossible now to obtain repair parts or new apparatus without long delays. The rise in the price of copper has been unable to check the demand for electrical goods, which are taken at almost any price in the market to-day. But, perhaps, the best feature of the situation is that it looks as if it would last. Certainly there is nothing in sight now that gives a reasonable ground to fear the ebbing of the tide of prosperity.

It is rarely proper to boast; a journal should only when it distances all its competitors. On Thursday evening, October 26, the ELECTRICAL REVIEW, containing a full account of the first day's convention of the American Street Railway Association, which had taken place two days before, was circulated at the convention at Chicago. This was two days before the appearance of any of the other electrical weeklies.

TEXAS ELECTRICAL NEWS.

[From a traveling correspondent.]

South Texas is at the present time keeping up with the procession in matters electrical. This is particularly true of the city of Houston, where I find a new and very commodious electric lighting and power station in course of construction, which, when completed, will be equipped with the most modern class of steam and electrical apparatus, with a capacity ample for a city of 100,000 population.

The Southwestern Telegraph and Telephone Company is rebuilding its lines throughout the city preparatory to installing a central energy system, and the Citizens Telephone Company (independent) is at work with a very large force installing its plant, which, judging by the work already done, promises to be first-class in every respect. I am informed this company intends to use the Beach-Cook transfer system of switchboard and the magneto bell-call system, but just what make of telephones will be adopted has not yet been definitely determined. Nothing but the very highest class of apparatus will be acceptable to the company, and when the final decision is made it is safe to say it will be apparatus that will give good satisfaction to the public. This company now has about 1,400 subscribers under contract. The plant is being built to accommodate 2,000. It is expected to be in operation about January 1. The work is being done under competent supervision.

The Long-Distance Telephone people have recently been giving a series of receptions in Houston, Galveston, Austin and other Texas cities, which have been very well attended by the business men, and which have been very successful in demonstrating the practicability of long-distance telephony. Conversations with Chicago, Detroit, Buffalo and New York were satisfactorily carried out, and the lines are now open for regular business to these points.

Galveston is also very active in the way of telephone work. I am reliably informed that the Bell company licensee now has 1,700 telephones in use in Galveston. Six miles of new cables are now being placed in position to take the place of open wires which became too burdensome. This company is arranging to open a toll parlor on the street floor of its building, which will be very invitingly furnished. It is the intention to furnish magazines and other reading matter for the entertainment of patrons while waiting to use the toll-lines.

I quote from a daily paper here an account of a legal decision recently rendered, which will probably be read with interest by the toll-line contingent of your patrons:

"In the district court yesterday evening and last night C. K. Lee, of Galveston, represented the Gulf, Colorado & Santa Fé Railroad Company and L. McLaurin the Southwestern Telegraph and Telephone Company in a suit which grew out of an effort of the telephone company to build a line from Galveston to Temple along the Santa Fé right of way, which was objected to. The telephone people resorted to condemnation proceedings through the county court. Commissioners were appointed, who assessed damages thought to be excessive and the telephone company appealed from the findings of the commissioners to the county court, where the jury returned a verdict in favor of defendant. An appeal was taken to the Court of Civil Appeals, First Supreme district, at Galveston. The case was reversed and sent back to the county court, where it is now pending. The telephone company deposited double the amount of damages assessed by the condemnation commissioners, together with the costs, and commenced work on the line. The Santa Fé served out a writ of injunction in the district court of Galveston County restraining further operations, and Judge Stewart made the writ returnable to this county, which was heard yesterday. Council for the railroad took the position that, notwithstanding the Southwestern Telegraph and Telephone Company had made the deposit as required by law, they could not proceed with operations while the suit remained unsettled. The telephone company, through its counsel, contended that the law in such cases made no other requirement than to deposit double the amount of damages assessed in the court where the suit was filed; that this the telephone company had done, and in addition was a perfectly solvent corporation and that there was no course for the court to pursue but to dissolve the injunction and allow the company to proceed with its work. The debate between the lawyers consumed six or seven hours, an almost limitless array of authorities were presented by each side, and the arguments were exhaustive. At the conclusion of argument Judge Sinks thought the fine discrimination in the questions of law involved in the case justified him in taking the matter under advisement."

Among the prominent electrical people who have recently visited Houston and Galveston I see the names of Colonel E. K. Baker, Frank B. Knight, L. C. Boyce, all Bell telephone people; L. W. Cass, of the Commercial Electric Supply Company, St. Louis; E. H. Raggio, of the Western Electrical Supply Company, St. Louis.

Paul Bossart, an old-time telegrapher and a pioneer telephone man, is temporarily located in Houston.

J. H. Hill, a former telegrapher, is the popular general manager of the Galveston, Houston & Henderson Railroad Company, with headquarters in Galveston, where the latch string is always on the outside for any deserving member of the clan.

M. O'Reanon.

Houston, October 18.

The Marriage of Mr. Warner and Miss Young.

Mr. M. J. Warner, of the Connecticut Lighting and Power Company, and Miss Olive Young were married Thursday evening, October 19. Miss Young is the daughter of Mr. and Mrs. A. M. Young, and the marriage occurred at "The Anchorage," Mr. Young's beautiful Summer home on Long Island Sound at Pine Orchard, Ct. There were four hundred guests present, coming in special trains from Washington, New York and Waterbury, and among them were a number of electrical people of prominence, friends of the groom and the bride's family. Mr. and Mrs. Warner will reside in New York city upon their return from a sea voyage in southern waters.

The visitors were met with carriages and domiciled over night in the Summer hotel and cottages at Crescent Bluff, engaged for the occasion by Mr. Young. At 5.00 P. M. a "tea and chocolate" was served, at the lodge, to the guests present. After the wedding ceremony more substantial refreshments were served in Delmonico's always satisfactory manner. The spacious grounds were electrically lighted and the house brilliantly illuminated with innumerable designs of incandescent lamps. The gifts were of rare taste and value, including beautiful remembrances from Vice-President Hobart, Governor Voorhees, ex-Lieutenant-Governor Sheehan and other friends of the young couple. In addition to a pearl necklace, of marked beauty, Mr. A. M. Young presented his daughter with a handsome new cottage recently built at Crescent Bluff, adjoining his home. The wedding was one of the most brilliant and notable ever held in the state of Connecticut.

A Proposed American Exposition in Russia.

A project formed by the Hon. E. A. Hitchcock, the Secretary of the Interior, while he was Ambassador to Russia, has been taken up by the American Commission to the Paris Exposition, which has issued a circular calling attention to the proposed plan. It is to hold at St. Petersburg, or Moscow, in 1901 or late in 1900, an exhibit of American manufactures and machinery. It is thought that arrangements can be made to remove American exhibits at Paris next Summer to Russia upon the close of the French exposition with the minimum of expense. It is said that the Russian authorities will cooperate willingly to make the proposed exposition a success, and that they will make extraordinary concessions in the way of transportation rates, custom duties, etc.

PERSONAL.

Mr. Robert McA. Lloyd has been elected president of the Electric Vehicle Company, of New York, vice Mr. Issac L. Rice, resigned.

Mr. A. L. Tucker, of the Western Electric Company, was one of a Committee on Publicity for the Street Railway Convention at Chicago.

Albert J. Earling, the new president of the Chicago, Milwaukee & St. Paul Railway, began his career when a boy as telegraph operator at Oconomowoc.

Mr. Fred A. Larkin, New York manager for the E. P. Allis Company, Milwaukee, and Mr. M. G. Starrett, chief engineer of the Metropolitan Street Railway Company, of New York, returned last week from a two weeks' hunting trip in the Maine woods.

Mr. W. J. Watson, of Boston, for several years representing the American Electrical Works, of Providence, in New England, has removed to New York city, where he will act as New York agent for the same house, with headquarters in the Havemeyer Building. Mr. P. C. Ackerman, who has been the representative of the American Electrical Works in New York city for a number of years, has resigned to enter other business.

Mr. H. C. Farnsworth, who for a number of years traveled throughout the New England States selling electrical machinery, is now representing the Sprague Electric Company in that territory, having offices in the Exchange Building, Boston. Mr. Farnsworth's acknowledged ability and aggressiveness will no doubt stand in his favor, as of yore, and his many friends in New England will be glad to find him going over his old territory.

A Sensational Electric Fan Story

A prominent New York newspaper printed on October 10 the following press telegram:

MILWAUKEE, WIS., Oct. 9—Mary Leiser, a domestic employed in a local hotel, was killed yesterday by an electric fan. She had washed her hair, which was of unusual length, and while holding it to dry before the fan, its meshes were caught in the rapidly revolving blades. These beat her life out before the fan could be stopped. Miss Leiser was 20 years old and an orphan. Her home was in Madison, Wis.

The correspondent of the ELECTRICAL REVIEW at Milwaukee, in answer to a query, sends this:

The manner of the death of Mary Leiser, as per the enclosed clipping which I return to you, is the lurid fancy of the reporter so far as the electric-fan incident is concerned. There was no electric fan there. The facts are: In drying her hair, she was utilizing the draft from a live belt, was caught in it and crushed by the flywheel at the engine, which engine happened to be driving a dynamo,

CARE OF CAR EQUIPMENT.*

BY J. H. VAN DER VEER.

When the writer was first put in charge of a street railway equipment, the road had a certain number of cars and it took all of them to operate the road, except from 8.00 P. M. to 6.00 A. M, during which time all inspections were made and all possible overhauling done. If a car broke down during the day every one possible was put to work on it, including the motorman and conductor. As the motormen in those days all carried kits of tools with them and inspected the motors at the end of each round trip, they were very helpful when it came to overhauling. However, those days have passed away with the double-reduction motor.

In the maintenance of motor equipments to-day, where almost continuous service is demanded and high mileage made, only those equipments fitted with both oil and grease boxes will safely run over forty days without a thorough overhauling. To do this overhauling a large road will be obliged to do it at a number of different points. To overhaul a motor car thoroughly it is advisable to have at each overhauling shop extra trucks with motors mounted and all in first-class order ready to run under a car body whose trucks and motors need overhauling. To properly lift the body from the trucks, four duplex chain hoists, or air hosts, conveniently located together with two cross timbers and four stirrup irons form as good a combination as can be found, and will do the work with the least possible injury to the car body. When the body is lifted the truck to be overhauled is run out and the good truck substituted, car lowered, connected up and turned over to the operating department. The whole operation takes about one hour, and for that length of time only is the use of the car body lost. For convenience in overhauling a suitable crane, properly located, equipped with a carriage and another duplex or air hoist, will be found of great convenience. Such a crane can be readily made in any blacksmith shop, and for the arm a piece of old rail can be used. When the motor is opened the armature should be lifted out and placed on a suitable rack, where the commutator can be cleaned and the armature tested for insulation. The fields should also be tested for drop, and where there is a drop those fields and armatures should be used in motors by themselves, keeping new and rewound fields and armatures in motors by themselves. This prolongs the life of the equipment and reduces the number of crippled cars taken off the road. The motor shell should be thoroughly cleaned out, either by compressed air or by washing with kerosene. The grease in the grease boxes should be taken out and put in the gear case and the grease boxes thoroughly washed out with kerosene. Brush-holders should be taken out and thoroughly inspected and cleaned. At the same time you have the best opportunity for truck inspection. The writer has found that all overhauling done with the car standing over the pits, the bottom half of motor dropped, does not allow the thorough overhauling necessary to keep the motor equipment in the shape it should be kept, besides tying up a complete equipment while such overhauling is being done.

In the matter of general inspection, a car started out, say to-day, in perfect order will safely run five days before it is necessary to inspect it again. In this connection, to inspect from twenty to twenty-five cars per day, one man can be responsible for the proper inspection of all trolleys, including the taking out and replacing of any defective poles, wheels or springs, and the straightening of all bent poles. Another man should be responsible for the proper inspection of all circuits, together with hood switches, fuse boxes and lightning arresters. Another should give his whole attention to controllers, while the brakeman and his assistants should be able to keep all brakes in good shape and replace all worn-out shoes. This arrangement of inspection and overhauling should keep the truck and motor equipment in good shape, if the night men take equally as good care. The writer recommends doing as little work as possible at night. At a car house operating, say, 100 cars, three men should be able to grease motors, inspect brushes and make any small trolley repairs. Car-cleaning should come directly under the operating department. The night car-cleaning should be limited to sweeping out, cleaning windows and dusting cars, while all washing should be done in the daytime while the car swings or is on the stand, if the car house is on one end of the line. In connection with car-cleaning, if the cars are of the closed type—seat risers and drop sash—the space under the seat should be cleaned once a week, as the traveling public have a tendency to drop newspapers, apple cores, etc., down behind the seat back, not to mention the bits of lunch the motormen and conductors drop there if their runs compel them to eat on the car. The best way to avoid this, and to also save the annoyance of rattling sash, is to make the sash stationary and cover over the space between the top of the seat back and sash rail. This, of course, does away with blinds and compels the use of curtains. The cost of maintenance is reduced by using curtains, and, at the same time, if you happen to be an official riding in a car of this type, you need not be in fear of a passenger pulling a blind with three or four broken slats, and the whole thing covered with dust so thick that you can write your name in it with your finger.

A car house from which 100 cars are operated should have a good carpenter stationed there to make small running repairs and to take care of bell cords and register-ringing devices. Any car that has been in a collision and damaged so badly that it can not be repaired in one day should be sent to the general repair shop. All cars should be taken to the general repair shop once a year and the body put in thorough repair and the car varnished or burnt off and painted anew, as the case may demand. While the car is in the carpenter's hands the wiring should be gone over carefully and put in shape. If the car goes to the shop with its regular truck and motors, the truck should be run out and gone over thoroughly. In case it is a built-up truck all rivets and bolts should be carefully inspected and renewed where necessary. In case of a solid side-frame truck it should be carefully squared to see that it has not sprung. The brake rigging at this time should be taken apart, and if it is a truck with brake beams working in slides the beams should have what are termed "Dutchmen" jumped into the ends to bring the wearing parts back to their original thickness, as the beams will probably be found to have worn wedge-shaped. If the brake beams are hung by links these should be renewed where signs of wear show. At this repair shop should be concentrated all classes of repair work; not only repairs to bodies and trucks, but all electrical repairs. The writer believes it pays for all railway companies to make their own repairs to electrical apparatus, including the making of armature coils and renewing of commutators.

In connection with the latter the writer has found that hard-drawn copper makes the best commutator. This is bought in lengths and the bars sawed off with an ordinary metal saw. It will be found that the same bar will often do for several types of commutators. In making commutators yourself it is well to study out the the diameter and increase that over those turned out by the factories as much as you can safely get between the brush-holders. Drop-forged bars can also be had for any width of commutators you wish.

On repairs to controllers, hood switches, etc., most roads will find it cheaper to buy the ordinary repair parts and then assemble them themselves.

In conclusion, the writer has found that it is advisable to make car body repairs, painting, rewinding armatures, making commutators, armature coils, field spools, etc., by piece-work. If good inspection is provided and the prices honestly watched, both the company and its employés are gainers by this method. The writer has in mind a case in point. A shop was operated by day work, and the regular carpenters' wages were $2.25 per day of ten hours. Cars that were being remodeled were costing $120. This was changed to piece-work, and each car given to four men for $110 per car. It was found that the men could do it easily for this and make about $6 over their regular wages. They soon became so expert at this line of work that the price was cut to $80 per car gradually, and the cars are being turned out at this price now, and the men are averaging $2.50 per day. Close inspection, however, is a necessity.

* A paper read before the Chicago meeting of the American Street Railway Association, October 18, 1899.

The Growth of a Large Electric Manufacturing Company.

With the extensions lately put in at Schenectady the General Electric Company now employs nearly 13,000 hands as against 7,500 a year ago. Its present output of electrical apparatus is valued at about $2,000,000 a month. The capitalization of the company is now $20,827,200, of which $2,551,200 is preferred stock. It is expected that the net earnings of the company will be about $6,000,000 this year, which will mean about 25 per cent earnings on the common stock, though the dividends may not be increased for some time.

A New Cable Project.

The Central News telegraphs from New York to a British journal to the effect that advices received at Victoria, Vancouver, from Japan, state that at the approaching session of the Japanese Diet consideration will be given for a concession to a proposed cable from Victoria to the Philippines, *via* Japan. The promoters, who are sanguine of success, undertake to reduce by half the present cable rates to the Far East.

The Pollak-Virág System of High-Speed Telegraphy.*

Interesting experiments with the Pollak-Virág system of fast-speed telegraphy were made on several nights last week between Budapest and Vienna, when a speed of from 1,300 to 1,500 words per minute was attained. The tests were made, we understand, in the presence of the German technical officials, and a representative of the French Government was also present. The following is a technical description of the apparatus:

The transmission is effected by a perforated strip of paper, as in the case of the Wheatstone automatic, and a telephone fitted with two small mirrors serves as the receiver, the diaphragm of the telephone being set into oscillation corresponding to the current impulses generated by the transmitter. These oscillations are made visible photographically. The dots and dashes of the Morse code are represented by strokes on either side of the central line, as shown in Fig. 1, the strokes being produced by current impulses in different directions. The transmitting apparatus, B, Fig. 5, consists of a roller driven by a motor or clockwork. This roller moves the perforated paper forward, and is connected with the line. The strip of paper is perforated in two lines corresponding to the two directions of the current, and above it two brushes are fixed, one connected to the positive pole of one battery, the other to the negative pole of another. The return wire is connected with the other two poles of the two batteries. Now, if in consequence of the perforations of the paper, one of the two brushes comes into contact with the metal roller, a positive or negative current flows through the roller to the line and thence to the receiving apparatus.

At the receiving station B the currents, as already mentioned, pass through a telephone whose diaphragm is moved in a direction determined by the direction of the current impulse. The movements of the diaphragm are transmitted to a small mirror with the assistance of a metal rod. It is necessary that the small movements of the diaphragm should occasion a relatively large displacement of the mirror. This is done by fastening to the mirror a small plate of soft iron, held in position by one pole of a permanent magnet. The pole of the magnet ends in two points, and holds the mirror in such a way that the line joining these two points is the axis about which the mirror turns. The other pole of the magnet is provided with a weak spring, also ending in a point, and forming the third point of support of the mirror. This spring is now connected to the diaphragm by means of a small rod, so that the small movements of the diaphragm

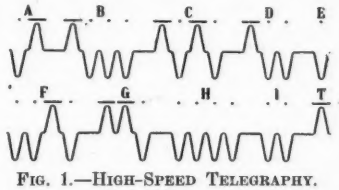
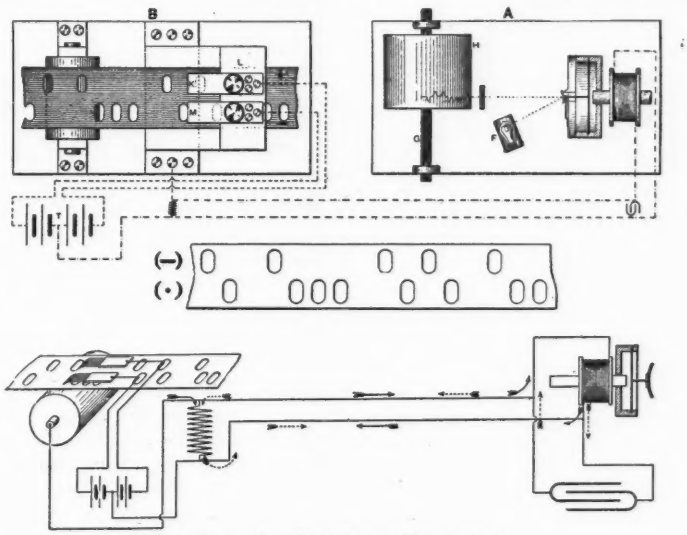


FIG. 1.—HIGH-SPEED TELEGRAPHY.

cause a rotating motion of the mirror, which is relatively large as the points of support of the mirror are very near to one another. This method of magnifying the movements of the diaphragm has the advantage that, in consequence of the small weight of the moving parts the velocity of vibration of the diaphragm is not lessened. The light of a small glow lamp falls on the small concave mirror just mentioned, which throws the image of the filament on a piece of paper sensitive to light. In front of this sensitized paper a cylindrical lens is placed, which draws together the long, narrow image to a bright point. In consequence of the current impulses which move the diaphragm and mirror, the spot of light moves out of its original position in one direction or the other. In this way the up-and-down strokes already mentioned are traced on the sensitized paper. The latter is wound on a drum which is mounted on a screwed spindle, so that the line traced by the light follows a continuous spiral route. The amplitude of the movements of the spot of light are large enough to make the signals clearly legible.

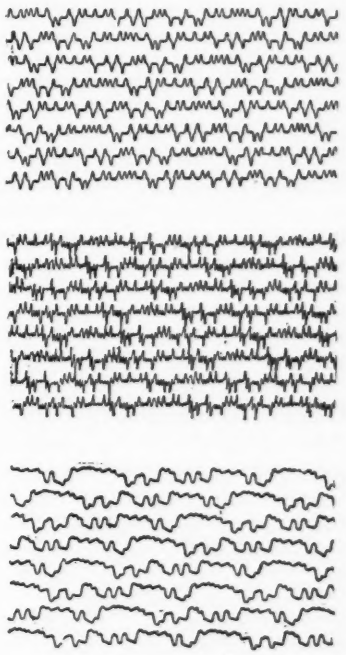


FIGS. 5 AND 6.—HIGH-SPEED TELEGRAPHY.

Although this action appears simple enough, allowance has to be made for one important disturbing factor; viz., the natural period of oscillation of the diaphragm itself. This is done by making the duration of each current impulse equal to the natural period of the telephone diaphragm, so that the current always stops exactly at the moment when the diaphragm is swung back to its original position. By suitably adjusting the velocity of the paper and the dimensions of the perforations, the duration of an impulse can be regulated, and a perfect damping of the membrane so obtained. But in order not to be dependent in practice on the precision of the movement of the paper, another device has been added. If the current impulse is shorter than the natural period of the vibration of the diaphragm, and a condenser is connected in parallel to the telephone, this condenser will be charged during the duration of the current impulse. After the current ceases, the condenser (as shown in Fig. 6) discharges into the telephone circuit, and prolongs the duration of the current. By using a condenser of suitable capacity, it is contrived that the diaphragm returns to its original position without first oscillating to and fro.

It appears that the inventors have not overlooked the fact that the properties of the line, independently of the apparatus, render fast-speed telegraphy difficult. An endeavor is made to counteract this influence to some extent by connecting, parallel to the line at the transmitting station, a coil with self-induction, whose dimensions are chosen according to the self-induction, capacity and resistance of the line.

The first experiments were made through an artificial line whose resistance was 2,000 ohms and capacity 8 to 9 microfarads. These having proved successful, the Hungarian Ministry of Trade kindly allowed tests to be made with four bronze lines of 3 millimetres diameter from Budapest to Temesvár. These were connected together at Temesvár, so that a metallic circuit 400 miles long and of 4,000 ohms resistance was obtained. The experiments were made both in wet and dry weather, and a speed of 70,000 words per hour, and 20 volts battery pressure, gave clear signals, while with 25 volts a speed of 100,000 words per hour was attained. Other experiments on a metallic circuit of iron wire 210 miles long and of 6,000 ohms resistance were also successful, a speed of 54,000 words per hour being obtained with a 60-volt battery. In the experiments the perforated strip was fastened on a drum in such a way that the same series of letters were constantly repeated. We have referred above to the most recent trials between Budapest and Berlin, which are stated to have given distinct and readable signals at speeds of from 1,300 to 1,500 words per minute. Fig. 2 is a reproduction on a reduced scale of the signals received, Fig. 3 shows the same series of signals without the device for damping the oscillations of the diaphragm, and Fig. 4 shows the disturbing effect of the line itself when the self-induction coil is omitted. The time taken to receive such a sheet with 500 to 600 words is stated to be 22 seconds.



FIGS. 2, 3 AND 4.—HIGH-SPEED TELEGRAPHY.

*From the (London) *Electrician*.

Investments in Street Railways: How Can They be Made Secure and Remunerative?

A paper having the above title was read at the recent Street Railway Convention in Chicago by Mr. Charles T. Yerkes, and was discussed at some length. A brief abstract of the paper appeared in last week's number of the ELECTRICAL REVIEW. Below appears a *résumé* of the discussion.

Mr. C. D. Wyman, of New Orleans, opened the discussion. He said in part: "Of the importance of sustaining and preserving the confidence and the faith of investors in the enterprises in which we are engaged, there can be no question. When it is remembered that one-third of the invested wealth in civilized nations is to-day placed in steam and street railroads, and not an inconsiderable portion of that investment is in the street railroads, that we should secure and hold the confidence of our investors, and that we should make their investments profitable is very manifest The great desire which now is manifest on the part of capitalists to put their money into street railroad enterprises is one which should be met by a corresponding effort on our part to make everything plain, clear and distinct to them in regard to such enterprise. In the selection of a board of directors among our stockholders, it is customary to select men of probity, position and reputation. The impression produced upon the public is most emphatic when these men are of the best reputation." Mr. Wyman thought that frankness and openness with investors is the best plan. Speaking of panics, he described the nature of these diseases of the financial market, and believed they could be warded off to some extent by keeping investors fully posted. He spoke of the important question of depreciation. Electric railroads being comparatively new are apt to lose sight of depreciation for the first few years, on account of the natural increase in their receipts. He thought this point worthy of the most careful attention. He argued at length for a frank, firm and conscientious management of railways.

Mr. John I. Beggs, of Milwaukee, said in part: "I think there is a side to this question that has not been touched upon. What protection is there for the payment of these securities when short-term franchises have ceased to exist? We are trying to plan what we will do in twenty years, when our franchise in Milwaukee expires." Mr. Beggs believes in a sinking fund arrangement. He said that a careful study of conditions in Milwaukee had shown that it was impossible to grant four-cent fares if it was at the same time intended to properly maintain the system. The longer time franchises have to run the more can be afforded for the betterment of the system and the greater the facilities that can be given. It is necessary, in order to give security to street railway investments, to make provisions for the bonds when the franchises have expired and when interest can no longer be earned upon them, to say nothing of the principal.

Mr. H. H. Vreeland, president of the Metropolitan Street Railway Company, of New York city, said that the great steam railways of the United States have created a great confidence in their management. It is as important for street railways to secure the proper men to manage the property as for steam railroads. In the latter the directors really do direct. "There is not very much done in street railways in that direction," said Mr. Vreeland. "The manager is elected and put to work and allowed to run the property. He does not get much help, and he has to be a man who can meet the local municipal conditions, the state conditions and the general conditions as affecting the properties as far as the legislative and municipal affairs are concerned. He has to be a man who can take care of the financial part and of the operating side, and he has to do it with very little assistance." Mr. Vreeland strongly indorsed Mr. Wyman's position regarding the importance of publicity. He said that consolidations have reached a point where securities in street railways have come into the hands of the investing public, and where the managers are the caretakers of the property of many people. He thought that the increase in the number of stockholders in street railways is a great element of strength; it means a common interest with citizens when municipal and state interference has to be looked after. "There is one further point that Mr. Yerkes suggested," said he. "and that is the labor question. It is the life of the street railroad. All other matters connected with the property are insignificant. The financial side, the transportation side, except as represented by labor, are insignificant as compared with the great problem of handling labor. In the large consolidations there are, say, fifteen or twenty different lines in which the employés have been handled under the theory and ideas of as many different managers, and you see how difficult it is to bring that body together, to try to get them responsible to one man and responsive to one method of management. It is a thing that requires a great deal of energy and ability, but it is a thing, if once accomplished, that gives the public to understand that the manager is managing the labor problem and not the agitator. And if you can get that confidence you must adopt the same policy of the agitator and take the platform that he does when he talks in his interests, and decide that it is just as valuable to the manager to go on that platform and talk to them in his interests; that is one of the greatest elements of strength in the street railway question in my mind, and I feel that it is one of the works in connection with the large work of consolidating the property, and I feel to-day that the success that has come to our property is largely attributable to this. The success of the investment is in the confidence of the stockholders and the general public that there is no crisis going to confront the property this year or next that may not only wipe out the dividend, but mean the wiping out of the entire earning capacity for that period and the disturbance of all the smooth working conditions that it is necessary to have at all times."

Mr. Thomas H McLean, of Toledo, and Mr. E. C. Foster, of Lynn, Mass., also spoke briefly. Mr. Foster said that in Massachusetts, where a board of railroad commissioners has supervision of the street railways, the tenure of franchises is different from that which prevails in the middle sections of the country. He regarded the conditions surrounding investments in railroads under this supervision as better than those prevailing in other states. Mr. F. G. Jones, of Memphis, made a few brief remarks, and was succeeded by Colonel N. H. Heft, of Meriden, Ct., who said that he believed the greatest benefit would come to the street railroads through the work of mechanical and electrical engineers in improving the present equipments of such roads. He thought that street railroad management should closely study the important question of equipment.

Professor W. S. Aldrich, formerly professor of mechanical engineering at the University of West Virginia, has been appointed professor of electrical engineering at the University of Illinois, at Champaign, Ill.

NOTES ON LIGHT.

BY WILLIAM ROLLINS.

NOTE LVII—THERE IS MORE LIGHT WHEN THE TARGET IS AN ANODE.

Lodge showed in 1896 that the X-rays started from the surface struck by the cathode rays. This was also the opinion of Roentgen, but Lodge added the significant statement that the rays were best when the anode was the place struck. In Note xvi I stated that if we arranged a tube so that the target was first an anode and then by simply cutting a wire, while the light was shining, made it a target only, the useful light was not sensibly diminished. Lodge was, however, correct, as I have since constructed various forms of tubes to test the matter by photography and find that the exposure must be longer when the target is not an anode, and the reason is this: The cathode stream, as shown by Varley and Crookes, is composed of material particles having charges of negative sign. When the target is an anode it attracts them as they approach it, increasing therefore their velocity. Hence the force of their impact on it is greater and the temperature to which they are raised is higher, which means, as shown in previous notes, a larger proportion of X-light to that of lower pitch. This is a point of importance in medicine, as we want to shorten the duration of the exposure. The observation also shows a reason why a single-terminal or a double focus tube may be less economical of current than a single-focus two-terminal tube, though for some forms of current they must be used. At the present time the static machine with a two terminal single-focus tube, in which the target is also an anode, is the best apparatus for hospital work. The plates of the machine should not be less than six feet in diameter, and there should be at least sixteen of them, run at a speed of 200 revolutions a minute for ordinary work on the thicker parts of the body. I have used a machine of this type and size for a long time and find it reasonably efficient, though we need much more power for some medical work, and must look to some modification of Trowbridge's or Tesla's apparatus for the future.

Electrical Instruction at the American Institute.

The American Institute of the city of New York has issued an announcement of courses in electricity provided by its electrical section. Particulars may be obtained from Secretary D. R. Lovejoy, 21 West Forty-fourth street, New York city.

CONSTRUCTION AND MAINTENANCE OF STREET RAILWAY TRACKS.*

BY EDWARD BUTTS.

The construction and maintenance of street railways involve two words, construction and maintenance, which are inseparable in considering a street railway enterprise relative to capital.

Is the street railway to be built for temporary purposes? Is it to be built simply to float on the market or to turn over to our successors and assigns, or are we to build a street railway to endure to the extremity of the present advanced stage of science, speaking particularly of the use and durability of materials?

The latter view will be accepted in preparing this paper.

In the matter of street railway construction the first thing to do is carefully to consider all the local influences which may become a factor in maintenance, or involve future changes, and so considering the subject from this fundamental position, the question naturally evolves into urban and interurban street railway construction.

It is desirable in all cases to construct the street railway in such a manner that, when the time comes making it necessary to reconstruct the interurban portion, the termini at the same time shall need the same attention; as a general proposition the urban end of a line is the governing factor when durability becomes the question. This is obvious for the reason of ramifying lines and concentrated travel.

For the present, then, we will consider urban roads from a standpoint created by practical experience and expenditure of capital.

The rails should be not less than six inches in depth with a width of base equal to the exposed upper surface. Where streets are paved with asphalt and a stone toothing course placed adjacent to the rails, the rails must be at least nine inches in depth in order that the base may be securely imbedded in the concrete below. Rails should be centre-bearing and rolled in sixty-foot lengths and handled so that they will be perfectly straight when placed in their final location.

Tie-rods one inch in diameter should be placed six feet centre to centre along the line, supplied with hexagon nuts which, when in place, shall clamp the rails securely on both sides. The tie-rod threads should extend far enough from the rod ends to allow the rod to be put in place without bending same. The theory of this rigid tie-rod is that the street traffic and pressure on the outside of the rails should be provided against as well as the car thrusts on the inside. The top of the tie-rod should be placed at the centre between the top and bottom of rails to accommodate better the paving, especially if brick or stone is adopted for the wearing surface.

The construction for rail foundations consists of digging a trench twenty inches wide on top and sixteen inches wide on bottom by enough depth to get six inches below the rails when same are to established grade.

In this trench, at ten feet intervals, are placed wooden blocks $8\times10\times16$ inches, and the rails are spiked securely to these blocks, which serve to hold the rails while the same are being laid and tamped to surface, the joints being held in position by temporary splices.

After nicely gauging, aligning and surfacing the track the trenches are filled with concrete, bedding the base of the rails up to the bottom of the proposed paving.

This concrete, which is placed in the trenches around the rails, is composed of crushed stone, measuring not more than one-half an inch in greatest dimension, mixed with Portland and domestic cement and sand.

The quantities of the above are mixed two parts sand, one-half part Portland cement, one-half part domestic cement and five parts crushed rock, all by measure. Great care should be taken to get the mortar flushed close against the rails and to bring same full up under the rail trams. The concrete in the trenches should be allowed about six days to set; however, this depends upon the condition of the atmosphere, as it sets much more rapidly in warm than in cold or chilly weather.

The concrete for paving foundation may be composed of one part domestic cement, two parts sand and four parts broken stone by measure, the broken stone to be not larger than two and one-half inches in the greatest dimension. All concrete should be thoroughly tamped until the mortar flushes to surface.

After the concrete has set cast-weld joints should be formed at all joints including the special work which may be needed.

The cast-weld joint on 80-pound rails should weigh 150 pounds, and on 100-pound rails, 200 pounds additional metal; the additional metal should be composed of two-thirds pig-iron and one-third common scrap iron. The metal should be heated to a bright yellow temperature and each joint formed with one pouring. The depressing clamps should remain in place for at least one hour after the pouring, and the surface of the rails finally dressed smooth, so that the transition of the car will be the same as if on a continuous rail. In preparing the joint, better results as to smoothness are obtained by inserting a thin shim between the rails than by placing the rails too close to admit the shim. These cast-welded joints should be so formed as to admit the wearing surface of the pavement with the least amount of interference practicable.

As a general proposition the wearing surface of the paving should be composed of the same material as the balance of the street, otherwise there will be an undue amount of vehicle travel on the street railway tracks, and consequently more frequent accidents will occur as well as a more limited durability of the wearing surface.

For instance, if the street is paved with asphalt and the track with brick or stone, heavy loads on slight grades will be driven on the stone or brick, for the reason that the latter material furnishes a better footing and keeps the grease well in play in the wheel boxes. On the contrary, if the street railway tracks are paved with asphalt and the street roadway with brick or stone, the drivers of light vehicles, as well as some of the other class, will immediately seek to occupy the street railway tracks.

At all times attention should be paid to drainage, and at street crossings, where the established grade is level, the surface of the tracks on one side should be elevated several inches to prevent the retention of water pools.

At all changes of grade the rails should be bent to form vertical curves and no joints allowed in these curves, as it is almost impracticable to form a uniform curve unless shop-work is resorted to. There is no economy in trying to construct a railway too hastily, as in so doing inferior work is generally done, and a future expense is the result.

The special work, turnouts, crossings and cross-overs, should be of cast-steel construction except steam railway crossings, which are best of regular built-up work located on the foundation. The tongues of turnout switches should be placed on the high or superelevated rail of the curves, otherwise the guard rail of the mate should extend the full length of the casting on which the tongue is located. All curves of a radius under 300 feet should be provided with guard rails, and curves of less than fifty feet radius should be double guarded.

A very important item, as a matter of economy in the construction of street railways, is the contract and specifications. This document should cover, without doubt, all that is intended to complete the whole line, and in street railway construction there is so much to consider that often items are left out or neglected which finally become very serious and costly matters.

In the matter of maintenance, when a line is constructed as herein provided, the maintenance question is thrown almost entirely on car equipment, involving the several items of wheel base, double or single tracks, diameter of wheels, properly applied springs and height of cars. The longer the wheel base the less durable the curve.

Single trucks will batter out frogs, switches and joints more rapidly than double trucks. This last also applies to diameter of wheels, weight of cars and, last but not least, the springs between the trucks and car body.

* A paper read before the Chicago meeting of the American Street Railway Association.

TELEPHONE NEWS

The Maryland Telephone Company will erect a seven story telephone exchange building in Baltimore.

The Sunset Telephone and Telegraph Company will place its wires underground at Berkeley, Cal.

The Central Union Telephone Company is completing its fifth toll-line between St. Louis and Alton, Ill.

Houston, Tex., is now connected with the long distance system of the American Telephone and Telegraph Company.

In Sweden there is a telephone for every 23 of the inhabitants and on the Pacific coast of the United States there is a telephone for every 28 of the inhabitants.

By the purchase of the New Britain Telephone Company's franchise, the Southern New England Telephone Company will be without a rival in the state of Connecticut.

In connection with the growth of the independent telephone movement as opposed to the Bell, it is of interest to note the fact that last year the independent companies in Michigan paid more taxes into the state treasury, according to official records, than did the Bell companies.

Arc Lighting Dynamos.

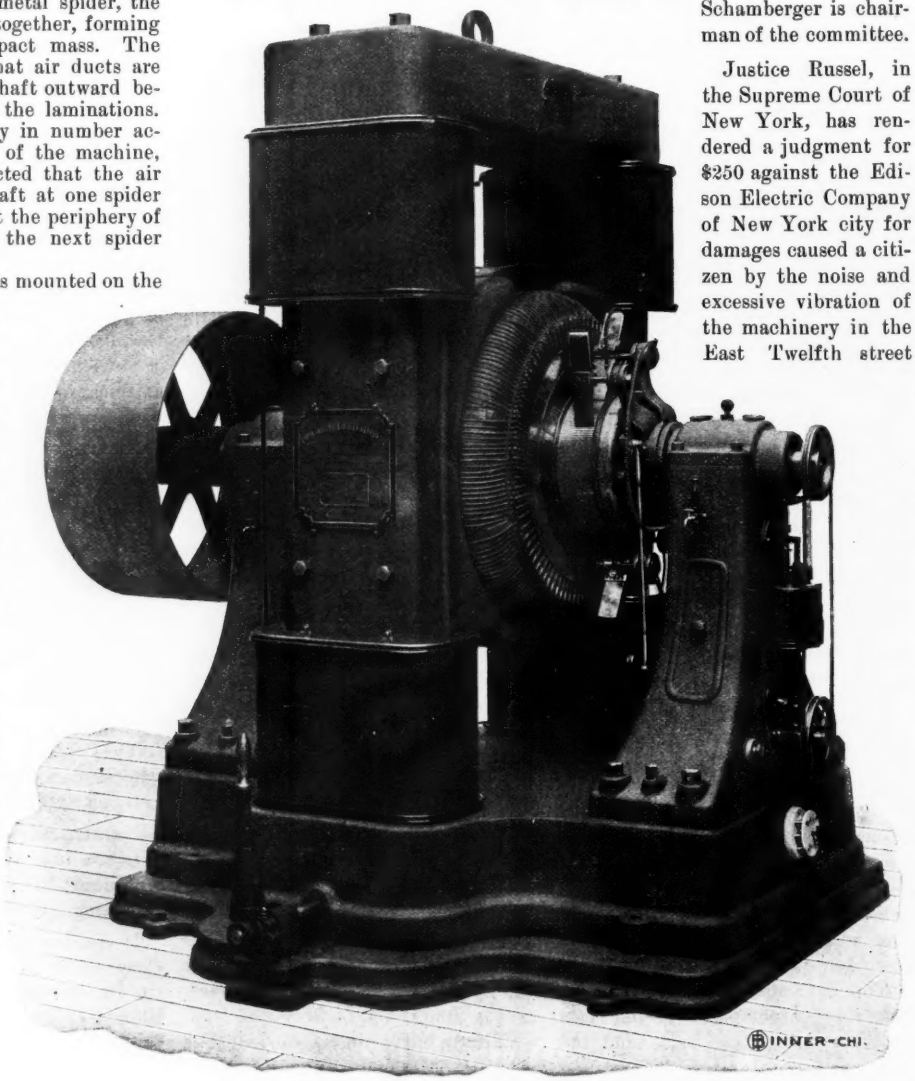
The first practical development of the dynamo electric machine was for arc lighting, but the crude machines of early years bear scarcely any resemblance to the highly developed types of to-day. The machine here illustrated is of the familiar "Wood" pattern, and represents the latest type of construction adopted by the Fort Wayne Electric Works.

One of the most important of the later modifications is in the armature construction. This now consists of a core built up of laminated sheet-iron mounted on a gun-metal spider, the whole being bolted together, forming a substantial, compact mass. The core is so built up that air ducts are provided from the shaft outward between the sides of the laminations. These air ducts vary in number according to the size of the machine, and are so constructed that the air entering near the shaft at one spider arm must pass out at the periphery of the armature near the next spider arm.

The commutator is mounted on the armature spider, thus securing a rigid support for the connection. The spools on the pulley end, as well as the spools on the commutator end, are wound alike. All of the arc dynamos of this type are now fitted with an improved regulator. The operating mechanism of this regulator is belted directly to the armature shaft; the regulator magnet controls a lever, which is connected to a friction clutch, one member of which is faced with hard fibre. The movement of this clutch in one direction rotates the brushes forward by means of positive gear action, while a movement of the clutch in the other direction rotates the brushes backward.

The regulating magnet is opposed by a coil spring, which is adjustable within considerable range, and the lever is fitted with a stop for throwing the regulator out of operation whenever this may be desirable. The regulator is so constructed that it may be used either right or left-handed by simply reversing the brush-holder yokes.

These machines are made in twelve sizes ranging up to 150 lights capacity. This size is shown in the illustration, the machine feeding 150 ten-ampere lamps and running at 600 revolutions per minute.



A 150-LIGHT, 2,000-CANDLE-POWER ARC DYNAMO.

ELECTRIC LIGHT FLASHES.

The Edison Electric Illuminating Company of Boston has declared a regular quarterly dividend of two per cent payable November 1 to stock of record October 18. Books will be closed from October 18 to November 2.

The electrical committee of the Philadelphia City Council has just recommended the passage of a bill adding 600 lights to the number now in use on the streets, and bringing the total paid for electric lighting by this city up to a little more than $1,000,000 a year.

The new cooperative electric light plant for Grand Rapids and Centralia, Wis., was started up a few days ago with satisfactory test. The plant cost $20,000, and all the stock, which is divided into $10 shares, is held by residents in the neighborhood.

The Boston Edison Electric Illuminating Company was unopposed at a recent hearing by the Gas and Electric Light Commissioners, on its petition for the right to raise $750,000 in addition to its present capital of $3,744,000 by a stock issue. The purpose as announced is to increase the plant.

The City Council of Gallatin, Tenn., has authorized the issuance of bonds to the amount of $10,000 to install an electric lighting plant, and at the same time has ordered a committee to advertise for bids for lighting the town. Mr. W. G. Schamberger is chairman of the committee.

Justice Russel, in the Supreme Court of New York, has rendered a judgment for $250 against the Edison Electric Company of New York city for damages caused a citizen by the noise and excessive vibration of the machinery in the East Twelfth street power house. The judge's opinion also enjoins the corporation from making any more noise.

The Edison Electric Illuminating Company of Boston has declared its forty-second quarterly dividend of $2 a share, payable November 1, to stock of record October 18. At a meeting of the directors the following officers were reelected: Jacob C. Rogers, president; Charles L. Edgar, vice-president; J. Otis Wardwell, clerk. At the annual meeting Raymon Apolloino was elected treasurer.

A special meeting of the stockholders of the Kings County Electric Light and Power Company will be held at the office of the company in Brooklyn, N. Y., on October 30, 1899, for the purpose of considering and acting upon a proposition to sell, lease or convey the property, rights, privileges and franchises of the Kings County Electric Light and Power Company, and other matters.

The Supreme Court of Pennsylvania has just decided that electric light companies in that state are manufacturing corporations for all purposes except taxation. They do not, however, fall within the clause exempting manufacturing corporations from state tax on capital stock. The higher court holds that electric light companies are of a quasi public nature, and that tax laws should be construed strictly. The opinion was on the appeal of the Keystone Electric Light, Heat and Power Company, which purchased the property and franchises of the electric light, heat and power company of Gettysburg and reorganized. The Attorney-General instituted *quo warranto* proceedings on the ground that there was no authority for the organization of an electric light company on the purchased franchise of a defunct company through a judgment sale. Under the decision of the Supreme Court the Gettysburg company has the right to reorganize under the old charter.

The terms on which the recent consolidation of the Pennsylvania Manufacturing Light, Heat and Power Company with the National Electric Company was effected are as follows: For Pennsylvania Manufacturing stock, 35 per cent, and for National Electric, 13 per cent, respectively, in the 50-year 4 per cent collateral trust notes of the Philadelphia Electric Company. Rights to subscribe to the new stock in the proportion of 66⅔ per cent of present holdings for stockholders of both companies; $2.50 is called on the new stock payable November 1; $17,500,000 Philadelphia Electric Company's fours will be issued, and to make the exchange for all of the stock of the Pennsylvania Manufacturing and National Electric Company requires $15,050,000. The balance will be reserved in the treasury to acquire other electric property in the city or adjacent thereto. The plan provides that 51 per cent of the stock of each company shall accept the proposition and that assenting stock must be deposited before November 1.

A New Push-Button Switch.

The new type of push-button switch illustrated herewith is designed to go into any standard switch outlet box that will fit any of the other makes of push-button switches. It is also designed to obviate many of the difficulties encountered in the makes of the other switches, among which are the following:

In making porcelain parts for switches, where a box-shaped base of porcelain is necessary, it is a well known fact that it is practically impossible to make porcelain, bake it and have it come out absolutely true where the parts are thin, as in a box for an electric switch. This also makes the porcelain base very fragile, and if the porcelain box is broken or cracked the work of the switch is impaired.

In the new switch this difficulty is done away with by having the contacts mounted on separate blocks of porcelain, which are straight and will permit of being made in a mold that insures uniformity in baking. Should the porcelain parts of this switch become broken it is easy to replace them without necessarily disturbing any of the other parts of the switch.

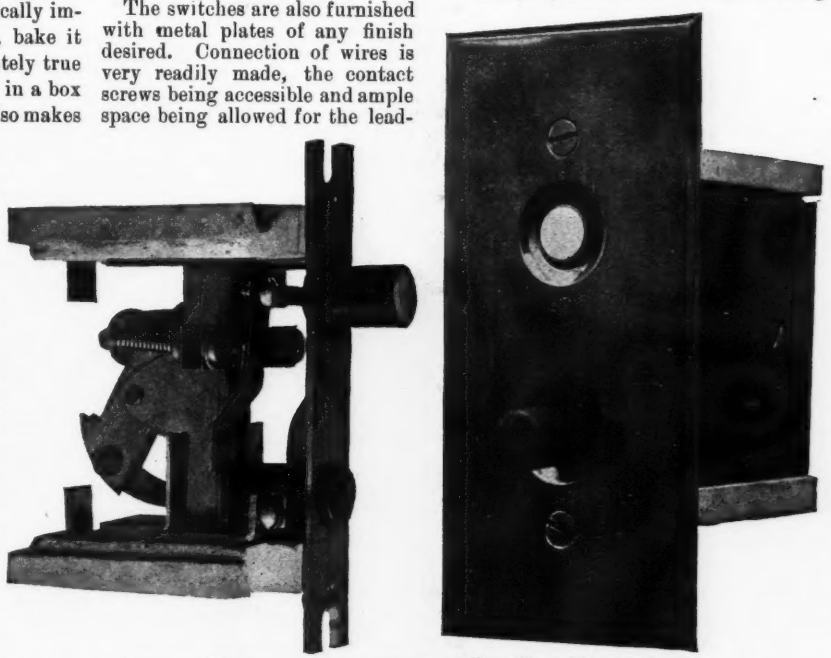
The contacts on this switch have a capacity of more than twice the rated capacity of the switch, and the contact parts in the moving part, being in themselves movable, adjust themselves to insure a safe carrying capacity. They also clean themselves by the action of the switch. The mechanism itself is very simple, and being of peculiar construction insures certainty of a quick make and break of the contract parts. After the buttons have been pushed a certain distance the making and breaking of the contact is absolutely under the control of the hand.

The special construction of the moving parts also insures certainty with regard to the switch being left on any dead centre.

The parts of the switch are all made by tools, no casting whatever being used, thus insuring the desirable feature of having the parts interchangeable so that repairs may readily be made by inexperienced people. Many times this is the means of saving the expense of a new switch. The switch is also designed to have an unusually long-distance break and can readily be used on 230 volts.

The fact that the switch has a removable cover gives access to the working parts in case of the switch becoming out of adjustment, and it can be very readily readjusted. This is an especially good feature of these instruments, inasmuch as in a porcelain box construction one can not tell whether the contacts have been well made or whether there is any heating. The switches are said to be thoroughly tested with double their rated capacity before leaving the factory of the General Incandescent Arc Light Company, New York, where they are made.

The switches are also furnished with metal plates of any finish desired. Connection of wires is very readily made, the contact screws being accessible and ample space being allowed for the leading in wires. The illustrations show the interior mechanism and exterior appearance of the switch.



INTERIOR MECHANISM AND EXTERIOR OF NEW PUSH-BUTTON SWITCH.

Telegraph to Dawson.

Under date of September 22, 1899, Consul Dudley, of Vancouver, states that the telegraph line from Skagway to Dawson has been completed and is now in operation. The nearest point to Skagway reached by telegraph, adds the consul, is Cumberland or Comax, British Columbia. It is stated that arrangements will be made for steamers to call at Comax to deliver messages brought from Skagway, and on their north-bound trips for messages to be delivered at Skagway. This places Dawson within about two and one-half days by telegraph. Mr. Dudley has also been informed that officers are at work surveying a line from Ashcroft, on the Canadian Pacific Railway, *via* Quesnelle, British Columbia, to Telegraph Creek, in the valley of the Stickene River. As soon as the survey is completed, it is expected that a telegraph line will be constructed; a branch line to Atlin, British Columbia, from Lake Bennett will also soon be in operation.

ELECTRIC RAILWAY NOTES.

The directors of the Chicago Union Traction Company have declared a quarterly dividend of one and one-quarter per cent on their preferred stock. It is understood that an effort will be made by the directors of the company, now in New York, to have the stock listed on the eastern exchanges.

The fact has just been made public that the Long Island Electric Railroad Company has sold all its lines running from the terminus of the Kings County Elevated Road, at the Brooklyn city line, to Jamaica, Hollis and Queens, from Jamaica to Cedarhurst, Lawrence and Far Rockaway, to the New York & North Shore Railway Company, which is controlled by the New York & Queens County Railway Company. The sale was consummated several months ago, but has not been announced until it was confirmed at a meeting of the directors of the company which has made the purchase.

After the use of fenders on electric cars in Chicago for an average of about six months, the *Record* of that city has made an inquiry to determine their efficiency in lessening the liability to accident. It ascertained that about seventy-two per cent of the persons struck during the six months escaped serious injury because of the use of the fenders. The seven fatal accidents resulted from the fender passing over the victims. The accidents of most serious consequences were distributed among the five or six different kinds of fenders in use, but the fender most in favor now with the street car men, after the trial, is the one that can be dropped to the track by a motion of the motorman's knee. The railroad officials generally opposed the attachment of the fenders as useless, and as liable to increase danger of injury because of their projection in front of the cars, but they are satisfied now that the fenders save enough lives to fully warrant their use.

Telegraph Rates to the Klondike.

The Dominion Government Telegraph of Canada, announces the completion of the telegraph line from Skagway, Alaska, to Dawson City, Northwest Territory, and that messages can now be accepted beyond Seattle, Wash., for a 10-word message and the additional word rate, as follows:

Skagway, Alaska	$0 35
Bennett, N. W. T.	1 35, *and 5c.
Cariboo Crossing, N. W. T.	1 85, *and 10c.
Tagish, N. W. T.	1 95, *and 10c.
Miles' Canyon, N. W. T.	2 10, *and 10c.
White Horse, N. W. T.	2 10, *and 10c.
Lower Labarge, N. W. T.	2 35, *and 15c.
Hootelinqua, N. W. T.	2 60, *and 15c.
Five Finger, N. W. T.	3 35, *and 20c.
Fort Selkirk, N. W. T.	2 85, *and 20c.
Dawson City, N. W. T.	4 35, *and 20c.

* For each additional word over 10 words.

Messages can be sent by first steamer from Seattle, Wash., to Skagway, Alaska, and thence by telegraph to destination.

LITERARY.

The "World's Practice Number" of the *Street Railway Journal*, which has just appeared, is a superb specimen of typography and reflects the highest credit upon its editors, contributors, artists, printers, and last, but by no means least, upon its business staff.

The Medical Record, published at 51 Fifth avenue, New York, has for years been one of the leading organs of the medical profession in America, and has gained a wide reputation as the recognized medium of intercommunication between the profession throughout the world. It is intended to be in every respect a medical newspaper, and contains among its original articles many of the most important contributions to medical literature. Medical news from all parts of the world is supplied through special correspondents by mail and telegraph; new publications and inventions are reviewed and described; in the editorial department matters of current interest are discussed, and the paper often contains items of interest to those concerned in the medical applications of electricity.

A LETTER FROM BOSTON.

LITTLE ITEMS OF ELECTRICAL INTEREST FROM THE HUB.

Everybody in the electrical industry in this town is as busy as a boy in a jam pot. They're taking in orders with both hands and delivering goods with one hand—when they have time. However, they always seem to have time to "visit with" electrical newspaper men. Only five of the latter tribe have been in town this week, and they have been covering the territory carefully. Somebody's orders may therefore be expected to fail of prompt shipment.

There are some mighty interesting times ahead in the storage battery business in Boston, and money is going to be spent in lawsuits, patent suits, criminal suits and attachment proceedings. I understand the sheriff's force of deputies is badly overworked. Just what the exact state of affairs is now constitutes a puzzle, and what the finish will be "no feller can tell." To learn the truth we'll have to do as the man who had the bear by the southern extremity did—"wait till the tale comes out." It'll be interesting for more persons than one.

The electrical people of Boston and vicinity are regretting the coming departure for a permanent residence in London of Mr. A. C. Shaw, who has been connected with electrical journalism in New England for more than 10 years. Mr. Shaw is deservedly popular, and no doubt leaves the field of his work with regret, even if he is, as I understand, to assume larger responsibilities of a similar character in London.

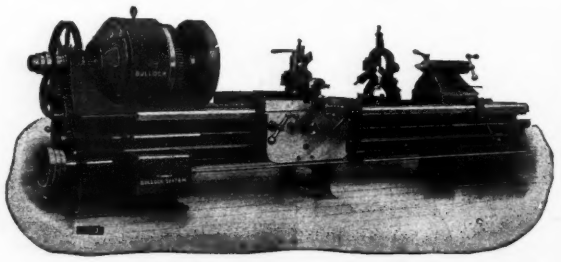
The electric street and park lights in Boston are tasteful in appearance. They are enclosed arcs with a spherical clear glass globe surmounted by a wide-glaring reflector. The poles are of wood with iron steps, and the lamp depends from an ornamental iron goose neck attached to the top of the pole. Just at the joint a key-switch for turning the current on and off is located. All the iron work is finished in silver paint and the effect is good.

There are a few electromobiles in public service here. They are somewhat larger in appearance than the New York vehicles, but are not so cleverly manipulated. The steering mechanism consists of a series of levers under the vehicle body connected with the rear axle, which is movable. An iron rod is brought up on the left side of the vehicle body to about the level of the operative's knees, when it is bent to the right at a right angle, bringing the end of the rod within easy reach of his right hand. The controlling switch is worked by his left hand and is on the left side of the seat. The steering gear isn't pretty to look at, but seems to be very prompt in its action—a trifle too sensitive, if anything.

The subway for trolley cars in Boston seems to be accomplishing all that was expected of it, as well as some other things that weren't expected. The prime idea, I believe, was to provide a means of getting the trolley cars off Tremont street, the Broadway of Boston, so as to relieve the enormous traffic on that thoroughfare. The subway has accomplished this, and now the merchants are complaining that there is no more a crowd of shoppers on Tremont street, and that they have gone a block below to Washington street, where the trolley cars form a pair of constantly squirming serpentine monsters crawling in opposite and parallel directions. The rental value of property on Tremont street, between Boylston street and Scollay square, has depreciated to such an extent that real estate men and merchants want the surface car tracks back again, but it is very unlikely that this will ever be done. While the present street car routes of Boston are a conundrum to the visitor, the native Hubbites seem to understand them, and there is no doubt that the subway is a valuable institution, especially for getting quickly across the city.

A good scheme is in use in the New England Telephone and Telegraph Company's public telephone pay stations in Boston. Three or four times a day the operator in charge is required to treat the transmitters in the booths with a dose of liquid germicide. This is done by means of an atomizer, and the results accomplished are threefold. First, the measure is a sanitary one, and, no doubt, is efficacious in preventing the possible spread of contagious germ diseases. Secondly, the man with an onion breath achieves his just reward when the onion germs strike the germicide and are deflected back upon his own countenance by the transmitter. Thirdly, the man who smokes in the booth and allows his dead cigar to remain on the shelf and pollute the air is saved from harsh punishment, for the germicide disinfects the place after him and makes it sweet and clean to the olfactory nerves. This, I am told, is greatly appreciated by ladies who do not smoke cigars.

This is a very much bespectacled town—the remark may have been made before. I should judge that 25 per cent of the young women telephone and telegraph operators belong to the "four-eyed brigade;" perhaps 10 per cent of the barbers wear eyeglasses; and at the crossing at Court and Washington streets a policeman wearing gold-rimmed spectacles is on duty. I intend to ask him what he does with his glasses when he is forced to arrest an obstreperous person.



A MOTOR-DRIVEN LATHE.

Such representative people as Mr. C. B. Price, of the Pettingell-Andrews Company; Mr. C. S. Knowles; Mr. Stewart, of the Anchor Electric Company, assure me that the electrical supply business is booming. The American Circular Loom Company, over in Chelsea, is doing a steady and profitable business, and the Lynn Incandescent Lamp Company, down at Lynn, Mass., is humming along. The Ziegler Electric Company, of Boston, according to Mr. Snow, is practically out of the electrical business in spite of its name. Its chief line of trade now is supplying schools and colleges with laboratory utensils and scientific apparatus. There are rumors afloat that an attempt will be made to form a combination in the electrical supply trade here. I have heard it said that Stone & Webster may have something to do with it. This firm were formerly known as engineers and testing experts, but latterly they seem to have gone more into the financial side of electrical propositions.

STEPHEN L. COLES.

Boston, October 23.

An Electrically Operated Lathe.

The illustration shows a 28-inch swing screw-cutting engine lathe driven by a Bullock type N motor. As will be seen in the picture the motor is placed directly on the spindle in the head-stock, taking the place of the cone pulleys. The armature spider is built directly upon the hollow spindle of the lathe.

By means of a new system of variable speed control the motor is given a greater range of speed without loss of torque than is ordinarily given by the cone pulley, having sixteen speeds in either direction, including the back-gear. The controller is placed upon the leg of the lathe directly under the head-stock, and is operated by a splined shaft running along the bed of the lathe and a handle which travels with the carriage. The slowest speed is 60 and the highest about 250 revolutions per minute.

The motor is fully described in Bulletin No. 0735, which may be had by addressing the Bullock Electric Manufacturing Company, Cincinnati, Ohio.

The British Copper Market.

Our London namesake says, in a recent issue: According to Messrs. H. R. Merton & Company's mid-monthly circular, the stocks of copper on September 15 were equal to 31,527 tons, as compared with 32,713 tons on August 15, and 32,389 tons on August 31. The fall since the latter date has therefore been equal to 862 tons. The shipments to European ports during the first half of the month have totaled 9,984 tons, while the deliveries have reached 10,846 tons. Of this latter total, 1,326 tons are, however, accounted for by shipments from Liverpool and Swansea to the United States, and had this buying on American account not occurred, stocks on this side would have risen and prices have fallen. It would be natural to assume that the agents of the New York syndicate had been "operating" on this side, with a view to keeping up prices, were it not for the fact that during the first half of September the shipments of copper from North America to Europe were quite up to the average, having equaled 5,039 tons. To buy 1,326 tons copper on this side—for reshipment to New York—while allowing 5,039 tons to come into the European market, is hardly good business for any but those Atlantic steamboat companies who carry the copper. The price of G. M. Bs. on September 15 was £77 per ton, as compared with £76 on August 15, and £76 15s. on August 31. The relative costs of copper and aluminum, when used for conducting purposes, are now expressed by

$$\frac{8.93\times8.65\times59}{2.68\times14.5\times100} = \frac{4,557}{4,886} = \frac{117}{100}.$$

Copper, therefore, at present prices is considerably dearer than aluminum at 29 cents per pound.

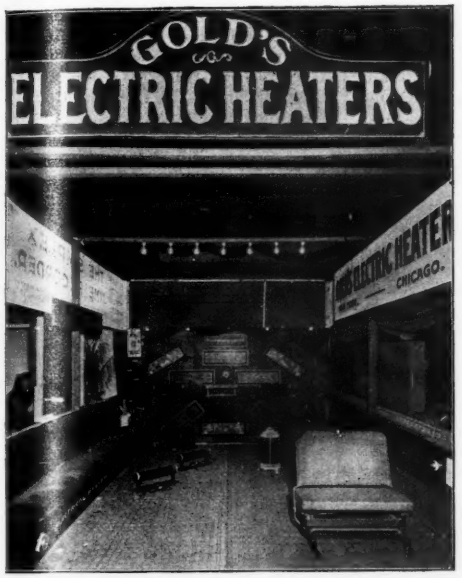
TRACTION MEN.

(*Continued from page 259.*)

Jones, vice-president Memphis Street Railway Company, Memphis, Tenn.

For secretary and treasurer: T. C. Penington, treasurer Chicago City Railway Company, Chicago, Ill.

For executive committee: President, vice-presidents and Messrs. C. S. Sergeant, second vice-president Boston Elevated Railroad Company, Boston, Mass.; C. K. Durbin, general superintendent Denver Consolidated Tramway Company, Denver, Colo.; Nicholas S. Hill, Jr., general manager Charleston Consolidated Street Railway and Electric Company, Charleston, S. C.; Charles W. Wason, president Cleveland, Painesville & Eastern Railroad Company, Cleveland, Ohio; and John R. Graham, president Quincy & Boston Street Railway Company, Quincy, Mass.



THE GOLD CAR HEATING COMPANY'S STREET RAILWAY CONVENTION EXHIBIT.

Upon a motion of Mr. Harrington, of Camden, N. J., the secretary cast the vote of the Association for the nominations as made.

Mr. Ira A. McCormack, of Syracuse, then read his paper, entitled "Train Service and Its Practical Application." This was a study of the planning of schedules, a problem that may be very intricate in a large city. The traffic varies from line to line, from hour to hour, and according to seasons, baseball games and other local disturbances. The idea upon which Mr. McCormack's thesis was based was that each car should be full of passengers. He cited as specific illustrations seven different varieties of lines, such as heavy-traffic lines in competition with elevated railroads, excursion lines, half of which are residential, non-remunerative lines kept up for hope of future value, etc. The paper explained the methods that had been adopted by the author for obtaining data, and went on to speak of the hours of travel and the fluctuations of the tide of travel in our largest cities. The paper then spoke of the mistakes of bad construction and of the important necessity of having good men for motormen. The author had found that men who had formerly been teamsters, drivers, etc., make the best motormen, while the semi-technical man who is learning the business makes the worst. The paper closed with remarks concerning the difficulty of making a proper record of the income of one line in a system containing several. Mr. Holmes opened the discussion. He gave some interesting reminiscences of early days of railroading in Kansas City, and described his method of employing new men. The treatment and handling of the men is a vital factor in the management of street railroads. His opinion of train service was that railway managers are merchants engaged in selling rides. The company is judged by its employés. The public does not come in contact with the president or manager, and therefore it is important to use the utmost care in the selection of the men on the cars.

THE CENTRAL ELECTRIC COMPANY'S AND CENTRAL UNION BRASS COMPANY'S JOINT STREET RAILWAY CONVENTION EXHIBIT.

Mr. H. H. Vreeland, at the request of the President, described the work of the great system he controls in New York city. His problem was to see how many cars he could run on the tracks his company possessed. The total movement of passengers on the Metropolitan lines in New York city in 1898 was 355,000,000, or only a little less than the total of passengers handled by the entire number of steam railroads of the United States. He spoke of the difficulty of making time-tables. This requires much study and expert knowledge. Mr. Vreeland illustrated the pertinence of the various matters described in Mr. McCormack's paper by describing the situation in New York:

"East and west of Central Park in New York—of course I can only bring illustrations from the line with which I am actively engaged—there are three lines on each side of the town," said he. "The regulation of the car conditions on these lines was almost equal during the early hours of the day; but a close study of the people and their peculiarities—the peculiarities of the different classes of people living on the different sides of the town—brought us to the conclusion that on the east side of the town the large car service should be started at 6 o'clock in the morning and the large car service on the west side of the town should be started at 8.30 o'clock in the morning. We were previously running very nearly the same service on both sides of the town, and the change meant, of course, the saving of a great deal of money."

He also spoke of the necessity for using storage batteries to keep up the voltage and accommodate the enormous rush of business on some of these crowded lines. Traffic diagrams, in the opinion of the speaker, are the most important thing for a man to have in operating a street railroad. "Indeed," said Mr. Vreeland, "the vast business of the Metropolitan system would be impossible without the close study requisite for the making of these traffic diagrams."

Mr. Heidelberg asked about the important question of the trading of transfer tickets, or schemes for swindling the railway company by getting two rides out of one nickel. Mr. Vreeland said that the story of the breaking up of this practice in New York was too long to recite in detail. Mr. Dimmock inquired about laws governing the crowding of platforms with passengers. Mr. Vreeland said that in New York the only regulation is that passengers are not allowed on the front platform with the motorman. His company did not obey the law, and, in the argument that he had made at Albany against it, he stated that the regulation affected the public and not the railroad company, and only meant that so many thousand of them could not go home until nine or ten o'clock at night if this law were enforced. He had suggested as an amendment for the legislature that they compel those passengers who wanted to go north to go south instead, as this would even up things on the cars and one scheme would be as sensible as the other. "In New York it is a question of inches of capacity per foot on the car," he said.

THE WARREN MANUFACTURING COMPANY'S STREET RAILWAY CONVENTION EXHIBIT.

The Secretary read a resolution of thanks by the supply men for the action of the executive committee in setting aside one day for inspecting the exhibits. The President an-

nounced that the new officers would be installed at the banquet (Friday evening), and said that the adjournment would not be until next year, as usual, but until the next night at the banquet table. The meeting then adjourned for the day.

In the afternoon the delegates were taken on a "Tally-ho" ride through Jackson Park and over the South Side Boulevard system, and later on were taken in trolley cars to the Stock Yards—a place to which, sooner or later, every visitor to Chicago is escorted by the patriotic citizens of that town. In the evening an enjoyable theatre party was given to the Association, the entire lower floor of the Columbia Theatre having been reserved for the delegates.

FRIDAY'S PROCEEDINGS.

On Friday the delegates devoted themselves during the day to sight seeing and amusement. At noon the ladies in the party started from the Auditorium in carriages and were taken for a drive through Lincoln Park and the North Side boulevard system. On the way back a stop was made at the Art Institute, where the party spent an hour admiring the works of art.

The delegates devoted themselves to examining the street railway exhibits in Tattersall's. Large crowds of visitors inspected the various displays at the hall during the day. These are described in detail below and fully illustrated on this and other pages.

THE BANQUET.

More than three hundred—ladies and gentlemen—enjoyed the banquet given at the Auditorium Friday evening. Mr. C. S. Sergeant, the retiring president, presided as toastmaster.

Following is the list of toasts and speakers: Hon. Wm. E. Mason, "Chicago"; Mr. Jas. W. Duncan, "Illinois"; Mr. John H. Stedman, "The Golf Caddy"; Mr. J. F. Calderwood, "Grouse"; Mr. W. J. Hynes, "General Topics." Mr. J. M. Roach, the incoming president, was then introduced and spoke; Secretary Penington also made short remarks.

PERSONAL MENTION—CONVENTION ECHOES.

General Falk, of the Falk Company, was present on the last days.

The Peckham Truck and Motor Company was represented by Messrs. Hanna and Gray.

Mr. J. H. McGill, of McGill-Pomeroy & Company, Chicago, was a frequent visitor at the exposition.

The Standard Underground Cable Company were represented by the manager of their western sales department, Mr. J. L. Wiley.

Mr. Henry Praither, manager of the Cleveland office for the Falk Company, of Milwaukee, entertained at dinner on several occasions.

"Jimmy" Atkinson, perhaps one of the best known gentlemen in the electrical field, was active socially and otherwise at the convention.

Mr. F. S. De Ronde, of the Standard Paint Company, New York, reached Chicago on Thursday and spent several hours with friends at Tattersall's.

Mr. Frank C. Randall, manager of the New York office of the Christensen Air-Brake Company, was one of the six six-footers who were prominent figures.

Rossiter & MacGovern Company, of New York, had reception rooms on the first floor of the Auditorium Hotel. Mr. MacGovern was in attendance personally.

Colonel H. C. Evans, of New York, entertained at a number of dinner and theatre parties. He was registered during the entire meeting at the Auditorium Hotel.

Mr. and Mrs. Wm. H. Huelings received many friends at their private parlors. Mr. Huelings has been for many years identified with the J. G. Brill Company, car builders.

Mr. Chas. E. Newton, of the Jewell Belting Company, Hartford, Ct., spent a few hours, while en route westward, in meeting acquaintances at Tattersall's on one of the convention days.

President J. F. Stevens, of the Keystone Electrical Instrument Company, Philadelphia, was prevented from being present at the convention because of an unusually heavy demand on his factory.

Mr. Geo. S. Searing, manager of the western office for Hart & Hegeman Manufacturing Company, was one of the electrical men present who has had a long year of associations with electrical industries.

The Electric Appliance Company, Chicago, entertained parties daily at their new establishment on West Van Buren street. Nearly all the gentlemen of this company were seen about the hotel corridors and exposition.

Mr. Chas. Y. Flanders was present for the St. Louis Car Company. Mr. Flanders for many years was well known to the street railroad industry as being associated with Morris, Tasker & Company, of Philadelphia.

Mr. J. H. Reid, who for many years was identified with the Westinghouse interests and now general manager of the Miller Electrical Maintenance Company, of Pittsburgh, spent two days in Chicago for the convention.

Mr. George A. McKinlock, president; Chas. E. Brown, secretary and treasurer; Messrs. Woods, Cobb, Latimer, Lowrey, Pierce, all of the Central Electric Company, Chicago, were present frequently to greet friends and patrons.

At a late dinner served in one of the grill rooms for a dozen "old-timers" at these meetings, a vote was taken as to the most genial man of the supply business, with the result that Mr. Elmer P. Morris arose to the point of a speech.

The Westinghouse Electric and Manufacturing Company, through the courtesy of the Southside Elevated Railway Company, had a special train carry an invited party of guests to the power house, and an inspection which was of great interest was made.

Mr. George P. Rex, secretary and treasurer of the Columbia Incandescent Lamp Company, came from St. Louis for the convention days with a party of people from that city. He returned home Thursday after giving a Nethersole theatre party before taking the train.

Secretary T. C. Penington and Mrs. Penington were registered at the Auditorium Annex, and were tireless in their efforts toward having fall arrangements go through in a successful manner. Mrs. Penington is one of the ladies to whom many thanks were freely given for the hospitalities of the occasion.

The John A. Roebling's Sons Company was represented by a staff of well known electrical gentlemen—Mr. Ulysses G. Tingley, of the home office at Trenton; Mr. Marston R. Cockey, of the New York office; W. P. Bowman, of the Cleveland office; Messrs. H. Jenkins, A. N. Whaley, C. H. Sewall, A. B. Conover, all of the Chicago office.

Mr. Henry N. Ransom, who has many pleasant acquaintances in the street railway fraternity, has recently resigned from the Consolidated Car-Heating Company, of Albany, to assume the position of purchasing agent for the Buffalo Railway Company, of Buffalo, New York. Mr. Ransom at the last moment was not able to be present.

DESCRIPTIVE EXHIBITION NOTES.

Paige Iron Works, of Chicago, exhibited crossings and special work.

American Protected Rail Bond Company was located on west side of exhibit hall, and had a large display.

Wm. Wharton, Jr., Philadelphia, rails, crossings and special work, was an exhibitor.

A. C. Becken, Chicago, exhibited an interesting line of the Paillard non-magnetic watches.

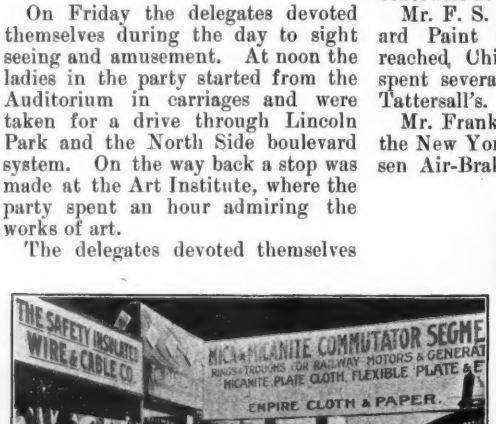
C. F. Orr & Company, of Chicago, showed an extensive line of conductors' and motormen's uniforms.

The Crane Company, Chicago, had a well arranged series of large and small valves of the most modern construction.

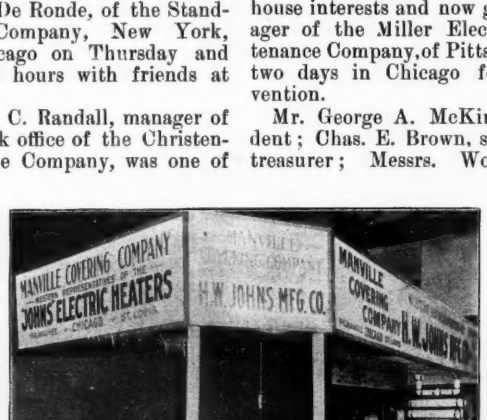
The Ohmer Car-Register Company, Dayton, Ohio, showed its "short method" system of keeping the office records for each car.

The Novelty Tufting Machine Company were represented in an attractive exhibit showing samples of their productions.

R. McLellan & Company, Chicago, Gales commutator compound, distributed souvenirs consisting of a


THE SAFETY INSULATED WIRE & CABLE CO.
MICA & MICANITE COMMUTATOR SEGME
RINGS & TROUGHS FOR RAILWAY MOTORS & GENERAT
MICANITE PLATE CLOTH FLEXIBLE PLATE & E
EMPIRE CLOTH & PAPER.

COMBINED CONVENTION EXHIBIT OF THE SAFETY INSULATED WIRE AND CABLE COMPANY, EUGENE MUNSELL & COMPANY, AND THE MICA INSULATOR COMPANY.



THE H. W. JOHNS MANUFACTURING COMPANY'S STREET RAILWAY CONVENTION EXHIBIT.

THE EUREKA ELECTRIC COMPANY'S TELEPHONE EXHIBIT AT THE STREET RAILWAY CONVENTION.

Manser cartridge which served as a knife.

Dearborn Drug and Chemical Works, of Chicago, had an exhibit consisting of oils and boiler compounds made by them.

Leschen – Macomber – Whyte, Chicago, manufacturers of wire and cables, had a centre aisle space and was looked after by Geo. Whyte.

Creaghead Engineering Company, of Cincinnati, had a centrally located exhibit with artistic groupings of poles, overhead construction, etc.

The International Power Company, Providence, R. I., builders of the Greene-Wheelock steam engine, were represented by their Western office.

Chas. Scott Spring Company, of Philadelphia, had a large display, of the fine springs made by them, both light and heavy.

Haywood Brothers & Wakefield Company showed designs of car seats for which it is a licensed manufacturer; also Simplex time recorders.

William Wharton, Jr., & Company, Philadelphia, displayed rails, railcrossings and a great many interesting devices used in track construction.

The American Vitrified Conduit Company, of New York, exhibited excellent specimens of conduits. The company was represented by Mr. B. S. Barnard.

Hale & Kilburn Manufacturing Company, Philadelphia, car seats, had their Chicago and western agent, H. N. Bigelow, looking after their interests.

The Consolidated Car - Heating Company also showed a line of electric car-heaters, which company was represented by Mr. Dubarry, of the New York office.

Leschen-Macomber - Whyte Company, of Chicago, in addition to a display of the products of their factory, distributed a handsome silver paper-knife.

Various car fenders, each having individual and meritorious features, were shown by the Consolidated Car Fender Company and the Providence Car Fender Company.

The Mica Insulator Company and Eugene Munsell had a very complete showing of mica for street railway purposes, and their booth was visited by their many customers.

Miller–Knoblock Company, of South Bend, Ind., were represented by Mr. A. W. Morrell, and displayed several assembled commutators, their specialties in the street railway line.

H. W. Johns Manufacturing Company showed a line of car heaters in practical operation. Many tests were given, and they were appreciated by their large number of visitors.

Watson–Stillman Company, of New York, had a display of hydraulic machinery, jacks, etc., which are made by them. Their space was prominently located and often visited.

Harold P. Brown, New York, manufacturer of Plastic rail bonds, had a motor testing the various types of bonds of his manufacture, and the exhibit was always thronged with visitors.

The Joseph Dixon Crucible Company, Jersey City, N. J., was represented by several gentlemen, and the company also had an attractively arranged display of crucible material and products.

Dearborn Drug and Chemical Company, Chicago, was represented by a number of gentlemen from the Chicago office, and an interesting display of the chemical compounds and possibilities was made.

Christensen Engineering Company, of Milwaukee, were represented by Frank C. Randall, and had working exhibits of Christensen air-brakes. Their many friends called upon them at their headquarters.

THE EXHIBIT OF THE MORRIS ELECTRIC COMPANY AT THE STREET RAILWAY CONVENTION.

The Siegrist Lubricator Company, of St. Louis, showed a complete equipment of the Siegrist automatic oiling system. The company was represented by the manager, Mr. J. N. Edelin, of St. Louis.

The large factories of Barney & Smith, car builders, Dayton, Ohio, were represented by several gentlemen well known in the street railway field. They had several samples of trucks, etc., in the convention hall.

THE STANDARD PAINT COMPANY'S AND WESTERN ELECTRIC COMPANY'S EXHIBITS AT THE STREET RAILWAY CONVENTION.

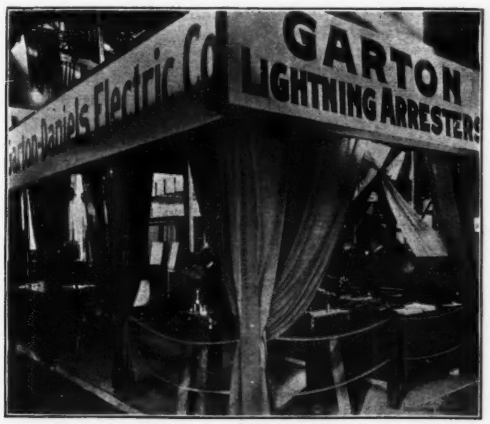


EXHIBIT OF THE GARTON-DANIELS ELECTRIC COMPANY AT THE STREET RAILWAY CONVENTION.

The Eureka Telephone Company, of Chicago, had an exhibit of telephones, and had one specially adapted for street railway purposes. Their display occasioned much interest and was visited by a number of interested men.

The International Register Company, of Chicago, had a sample board of fare registers, double and single cash fares and tickets. Their interests were looked after by Messrs. Brown, Woodward and Pratt.

Meaker Manufacturing Company and the Sterling Register Company showed a line of car registers in a booth at the south end of the building. Many street railway men made this booth their headquarters.

Cling Surface Manufacturing Company, of Buffalo, N. Y., were represented in an exhibit showing how slack belts could be improved by using "cling surface." Mr. A. B. Young, general manager, was present.

The New Haven Car Register Company, New Haven, Ct., arranged a most artistic stall for the purpose of showing the various forms of car registers made in its factory. Messrs. Bradley, Boyd and Anthony were present.

Adams & Westlake Company, Chicago, had on exhibition complete lines of car equipments, headlights, lamps and brass fixtures in large variety. They were ably represented by Messrs. Gray, Bartholomew and others.

Electric Railway Equipment Company, of Cincinnati, and W. R. Garton Company, who represent the abovenamed company, exhibited jointly, showing a line of trolley poles for single and double-track work, general railway equipment.

Garton–Daniels Electric Company, Keokuk, Iowa, had Mr. J. E. V. Titus to look after their interests. Three lightning arresters were shown in practical operation and were recognized and well thought of by every visitor at the show.

Miller–Knoblock Company, South Bend, Ind., sent a number of assembled commutators and commutator parts, showing the method of construction as employed in their factory.

The Gold Electric Heating Company, of New York, attracted much attention from the railroad men who were interested in the company's new and improved form of electric heaters. Messrs. Gold and Ward were present from the New York office.

Mr. George A. Schroever, representing the Multiplex Reflector Company, Cleveland, Ohio, was present. This company manufactures a reflector of new construction, claimed to be much stronger than any other used for street car service.

Ohio Brass Company, of Mansfield, had one of the most attractive exhibits at the convention, showing electric railway equipments and supplies in variety. They distributed handsome paper-weights as souvenirs. Represented by Messrs. King, Wilkinson, Byrns and Mead.

The Eureka Electric Company, manufacturers of telephones, Chicago, and the Garl Electric Company, of Akron, Ohio, were the only telephone companies who made displays in the exposition building. These companies both had special forms of street railway telephones.

The Safety Insulated Wire and Cable Company, of New York, were represented by Colonel Spencer, of St. Louis, who was on hand to greet

the many friends of the company. Their exhibit, attractively arranged, showed samples of all their makes of street railway wires and cables.

Central Electric Company and Central Union Brass Company showed a very complete line of well made overhead material which attracted much attention. Their exhibit was always crowded with their friends and customers, and their handsome souvenirs, paper knives, etc., were eagerly sought after.

R. D. Nuttall Company, Allegheny, Pa., were represented by F. A. Estep, president, and their several agents; F. D. Ridlon Company, Boston; Mayer & Englund, Philadelphia, and Standard Railway Supply Company, of Chicago. Complete lines of gears, pinions and trolley parts were shown in an attractively displayed exhibit.

The Cling Surface Manufacturing Company, Buffalo, New York, manufacturers of the compound known as "cling surface" for belts, were represented by Mr. F. C. Willis, manager of the Chicago office. This company has a unique exhibit and shows practically the value of its compound as a preventive of slippery belts, and the economies gained by its use.

The Speer Carbon Company, which has recently completed the construction of a new plant at St. Mary's, Pa., showed an excellent line of carbon products. The "Speer" carbon brush was well advertised throughout the exposition. The company had three representatives of its interests present, all of whom came from the East to Chicago solely to attend the convention.

The Falk Company, Milwaukee, had a large space on the main promenade, which was artistically arranged as a reception room, with a profusion of potted plants and easy chairs. The exhibition consisted of enlarged photographs of actual scenes of railway construction work where Falk joints were being used. Messrs. Henry, Praither, Worster, Smith and Jones and General Falk were in attendance.

The H. W. Johns Company had one of the best located stalls in the exposition, just opposite the editorial office of the ELECTRICAL REVIEW. Mr. J. H. Meek, manager of the electric heating department, came from New York to be present. This exhibition was one of the social centres of the convention, and from a practical and electrical standpoint the company's electrical heating apparatus was of more than general interest.

The Keystone Electrical Instrument Company, Philadelphia, was effectively represented by Mr. Elmer P. Morris and the Chicago agents. This company showed an exceedingly attractive line of switchboard and portable instruments for street railways and power plants for either direct or alternating current. Also series and shunt ammeters and track testing. The company also distributed a well illustrated little volume descriptive of electrical measuring systems and instruments.

An interesting exhibit was that of Harold P. Brown, New York. It consisted of a low-tension dynamo giving up to 3,000 amperes at from 5 to 10 volts. This was connected by heavy copper conductors to a joint of 80-pound T-rail from the Metropolitan Elevated Railway, and a joint of 70-pound rail from the North Side road. A rheostat was arranged to vary the current and comparative tests made with and without bonds and with various kinds of bonds, showed the merits of the Brown plastic alloy in a convincing manner.

The Western Electric Company was represented at the Street Railway Convention by Messrs. J. C. Cannon, Philip Rust and F. L. Swan. They had headquarters in Booth 30, where they entertained friends of the company and distributed printed matter and souvenirs to the visitors. The souvenir was a match-box having on one side an illustration of a petite arc lamp, on the other an illustration of a 16-inch fan motor, and on both edges of the box, "Western Electric Company, Chicago and New York." The box is finished in silver and white celluloid.

The new organization known as the American Steel and Wire Company and the Washburn & Moen department were represented by gentlemen from their offices in Chicago, New York, Worcester and San Francisco. The company exhibited trolley wires of many standard and special shapes, standard forms of feeder wires and insulated wires for street railway service. A feature of the exhibit was a huge representation in gilt of the "crown" rail bond. This was suspended above the stall, and, as it was perhaps ten feet long, was noticeable throughout the entire building.

The Standard Air-Brake Company, New York city, was the centre of great interest for practical railroad men. The company had made elaborate arrangements for a "live" exhibit of the air-brakes and motor compressors. This is a feature in engineering which is of vital interest, and the results which this company are attaining with the newest forms of this apparatus are well worthy of consideration. Through the courtesy of General Manager Joseph R. Ellicott, who was present in person much of the time at the headquarters at Tattersall's, there will be presented in next week's issue of the ELECTRICAL REVIEW, illustrations of the machines showing improvements and modifications as they are now constructed. In many essential features the apparatus is radically different from the early conceptions.

The combined exhibit of Eugene Munsell & Company and the Mica Insulator Company, of New York, Chicago and London, occupied a handsome booth, very tastefully gotten up, dark, rich blue material being used as the background, paneled in gilt, which gave a very rich effect. The companies' space, being fitted up with easy chairs and a handsome rug, somewhat resembled a richly furnished parlor. The Mica Insulator Company's exhibit consisted of "Micanite" plate, "Micanite" tubes and troughs, and various forms of insulation. Eugene Munsell & Co.'s exhibit consisted of mica in the sheet and a variety of sizes. Both the India and amber qualities were shown, also mica as it comes from the mines, and mica segments. Directly over the desk, suspended from the sign, was a large rare specimen of India mica, size 14 by 36 inches, probably one of the largest sheets ever mined. This is such a rare specimen that there are probably less than three or four pounds of mica of these dimensions in the United States. The souvenir distributed was a very neat card-case, and it was highly appreciated by the delegates in attendance. The exhibit was in charge of Mr. Chas. E. Coleman, western manager, assisted by Mr. Howard M. Frantz.

The General Electric Company was in full force with a large delegation from its various offices and factories. The delegates who attended were S. D. Greene, S. Trawick, Geo. Rosenthal, E. D. Mullin, T. P. Bailey, R. D. Beach, F. W. Willcox, F. E. Case, F. H. Strieby, A. H. Armstrong, W. F. Hayes, B. E. Sunny, F. Barbour, W. J. Ferris, E. D. Priest, J. J. Mahoney, F. M. Kimball, R. A. Swain, Geo. J. Cadwell, J. W. Johnson, W. B. Potter, F. N. Boyer, J. G. Barry, J. W. Buell, J. H. Livsey, H. R. Bishop, Jr., Geo. Breed, R. E. Moore, W. G. Carey, Ward S. Arnold, T. Ferris. The exhibit comprised two G E-55's mounted on a truck, which are to be used as an equipment for the Northwestern Elevated. These motors are 150 horse-power capacity. In addition there are two G E-100's equipped with the B-13 controller and electric brakes. The motors and brakes are mounted on a St. Louis Car Company's truck. One of the special features of the exhibit was the new G E-65 of 250 horse-power capacity. This motor was built expressly for the Paris & Orleans Railway, Paris, France. A large line of supplies of overhead material was displayed; also circuit-breaker, lightning arrester, assembled commutators, armature coils and porcelain insulators similar to those used on the third-rail system.

The headquarters of the ELECTRICAL REVIEW, where writing facilities for guests and easy chairs for all callers had been provided, was adjoining the main entrance on the middle and prominent thoroughfare of the exposition building. The ELECTRICAL REVIEW was the only weekly journal having headquarters in the building. It is modestly stated that great interest was taken in receiving copies of the journal with a complete report of the opening proceedings, the leading points in the President's address and in Mr. Yerkes's paper, descriptions of the prominent exhibits, lists of attendance, etc., etc., early Thursday evening in Chicago. Through the promptness of the telegraph company, who put through an 1800-word report on the wire for New York, the express company forwarded a special early edition of the ELECTRICAL REVIEW from New York. The papers were printed in New York Wednesday afternoon and distributed to the mail boxes of convention guests at the prominent hotels in Chicago just after supper on Thursday. This was the first complete report of the proceedings received by the conventionists, even though several contemporaries are located in "I will" Chicago. As one prominent man, an important official in the American Street Railway Association, remarked, "This is certainly the most energetic, interesting accomplishment I have ever seen from a newspaper standpoint performed by any electrical or technical journal. The American Street Railway Association owes the ELECTRICAL REVIEW a vote of recognition for paying the organization such a high compliment."

Warren's Liquid Pulley Cover, manufactured by the Warren Manufacturing Company, of Chicago, attracted the attention of the visitors and delegates. The covering is similar to paint, and is applied to the pulley with a brush. Its use prevents belts slipping, and allows the use of slack belts. Two hours after its application it is ready for use, and it is claimed very effective with leather, cotton, rubber or any kind of belting. The article is not new. It has stood years of practical tests, and has been most satisfactory under every condition that has been presented. The slipping of belts has been a serious question regarding the loss of power. Tight belts will wear more quickly than if they were slack, and slipping belts are worse. In both cases they waste power, oil and wear out machinery. The Warren Manufacturing Company claim their pulley covering has overcome all these conditions. The liquid is put up in various sized cases, and prices and catalogues will be furnished on application.

The Morris Electric Company and Mr. Elmer P. Morris, as personal representatives of several other companies, New York, presented an attractive and well arranged exhibit in the northeastern portion of the building under the main gallery. The exhibit contained a gigantic Morris railbond, General Equipment Company circuit breakers, Potomac Terra-Cotta Company conduits, National Manufacturing Company car-heaters, Spiral Journal Bearing Company bearings, J. E. Rhoades & Sons bell cords and hand straps for street railway cars, Keystone Electrical Instrument Company electrical instruments, Anderson Line material, Garton-Daniels lightning arresters, Van Dorn & Dutton truck sweepers, Simons Manufacturing Company gears and pinions, Hunter Illuminated Signs for street railways, the Speer Carbon Company carbon specialties and the "Speer" motor brushes. Mr. Geo. C. Ewing, president, and Mr. Elmer Morris ably represented the Morris Electric Company. The Morris booth was a favorite resort for both the ladies and gentlemen present. Roses and other flowers were given to the ladies, and at one end of the booth a reception room had been provided for the gentlemen,

where the aroma of clear Havanas coupled with a draught of refreshing beverage pleased many a patron and friend of the company. One order of 40 cars, included 200,000 duct feet, of terra cotta duct, made by the Potomac Terra-Cotta Duct Company for Havana; also general equipment for the roads at Havana, Lisbon, Portugal and Mexico City were gratifying contracts just received by this house.

The list of the Westinghouse Electric and Manufacturing Company's representatives at the Street Railway Convention comprised: Wm. Bauder, J. M. Duncan, C. S. Cook, F. McCoy, J. H. Reid, C. E. Skinner, N. W. Storer, F. S. Smith, W. M. Probasco, Pittsburgh, Pa.; W. W. Grant, Ottawa, Ont.; J. R. Gordon, E. Woodruf, Atlanta, Ga.; H. C. Marsh, Cincinnati, Ohio; R. S. Brown, Boston, Mass.; C. A. Bragg, Philadelphia, Pa.; A. Hatet, Westinghouse Electric Company of France; C. S. Powell, Cleveland, Ohio; W. S. Rugg, Irvin Dryer, C. W. Regester, Frederick Nelson, C. G. Burton, W. R. Pinkard, L. M. Harvey, T. A. Hall, T. P. Gaylord, Ivor Hennings, Chicago, Ill.; T. Julian McGill, Minneapolis, Minn.; C. F. Medbury, Detroit, Mich.; T. C. Frenyear, Buffalo, N. Y. The list of apparatus in the Westinghouse company's exhibit comprised one 500-kilowatt engine type railway generator, complete; one 400-kilowatt rotary converter, with starting motor; one railway switchboard, complete, for three generators, six feeders and one lead panel; two No. 68 500-volt railway motors, mounted in operating order on a Peckham truck; two No. 49 500-volt railway motors mounted in operating order on a McGuire truck; four No. K 10 series multiple controllers; one No. 70 railway motor, complete; one No. 69 railway motor, complete; one No. 56 railway motor, complete; one No. 56 railway armature, complete; one No. 68 railway armature, complete; one No. 69 railway armature, complete; one No. 69 railway armature, partially wound with commutator partially connected; also a complete line of detail apparatus, including fuse boxes, lightning arresters, canopy switches, etc., used in street railway equipment. The 500-kilowatt generator is one of three of equal size which the company has recently sold to the Monongahela Traction Company, of Pittsburgh. The switchboard shown in the illustration is also to be erected in the power-house of the same company. The Nos. 68 and 69 motors are the latest type of railway motors built by the Westinghouse company. In placing these motors on exhibition the company desires to bring before the public its newest triumph in electrical design. An important feature of the new motor is the increased current-carrying capacity of the field windings, which allows of an equal temperature rise in both field and armature. Heretofore cases have often been noted where the armature was in good condition while the field coils were roasted and ruined, due simply to the fact that the design of the motor was such that the temperature of the field coils rose to a far higher degree than that of the armature. Another feature is in the use of field poles, which are bolted to the yoke instead of being cast in as has been the practice for the past ten years. The success which these new motors have met with since being placed upon the market has far exceeded the company's greatest expectations. They were built originally on an order from the Third Avenue Railway Company, of New York city. A large order has also been received from the Brooklyn Rapid Transit Company.

INDUSTRIAL NOTES.

The Phoenix Glass Company's New York office is at 15 Murray street, not 15 Dey street, as was published in their advertisement last week.

Fire and weatherproof wire to meet all the underwriters' present requirements are carried in Chicago stock by the Central Electric Company, Chicago.

The Electric Appliance Company, of Chicago, has just issued a circular giving description and prices of its new switch "Eaco." The popularity of the Eaco tape will give the trade confidence in any article the Appliance company may put on the market under the name of Eaco.

The Manhattan General Construction Company has just issued a bulletin describing its "Manhattan" direct current enclosed arc lamps. This well illustrated and well written descriptive pamphlet, called "Bulletin No. 15," will be sent to any address upon application.

The Illinois Electric Company has just secured the agency for the peerless transformers, manufactured by the Warren Electric and Specialty Company, Warren, Ohio, and have just secured an order for 18 transformers to be shipped to the Wooster Electric Light Company, Wooster, Ohio.

The General Incandescent Arc Light Company, 572–578 First avenue, New York, has absorbed the Wright Discount Meter Company, and all inquiries regarding the Wright system of charging addressed to that company, or any of its various offices, will receive prompt and careful attention.

Electric Car-Heating Litigation.

A suit was brought recently by the Consolidated Car-Heating Company against the Palmer and Monson Street Railway Company for an alleged infringement of the patents owned by the former on electric heaters. The railway company was using the Gold Car-Heating Company's system of heaters, and this concern defended the suit at its own expense. The suit was dismissed, the court holding that there was no infringement.

Large Transformers.

A series of seven 1,500-kilowatt transformers, having a winding ratio of 4,000 to 100 volts, has lately been placed in successful operation in the plant of the Union Carbide Company, of Niagara Falls, N. Y. These transformers have internal losses of 18 kilowatts, which gives an operating efficiency of 98.8 per cent on a frequency of 30 cycles. The transformers are so designed that they can be operated with a maximum rise of temperature in the windings under a continuous full load of 40 degrees centigrade. In actual test they are all said to have shown up slightly under this limit. The design is such that, if desired, this temperature rise can be very much reduced by increasing the number of water cooling coils which extend down into the insulating oil.

The Wagner Electric Manufacturing Company, of St. Louis, Mo., which made these transformers, strongly urges the use of oil-filled transformers, believing that the durability of the machine is increased by the oil filling. It generally recommends also an auxiliary cooling device, either of air-jets or water-coils, as the exigencies of the case may require. These large transformers reflect, by their successful working, no little credit upon their makers.

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ATTENDANCE CHICAGO STREET RAILWAY CONVENTION.

DELEGATES OF COMPANIES MEMBERS OF THE ASSOCIATION.

Alton, Ill.: George D. Rosenthal, electrical engineer, Alton Railway, Gas and Electric Co.

Anderson, Ind.: Charles L. Henry, general manager; Charles Berry, superintendent, and Albert S. Richey, electrical engineer, Union Traction Co.

Atlanta, Ga.: E. Woodruff, president; J. R. Gordon, engineer, Atlanta Consolidated Street Railway Co. E. Woodruff, president, and J. P. Smedden, engineer, Atlanta Railway Co.

Augusta, Ga.: C. O. Simpson, secretary, Augusta Railway and Electric Co.

Aurora, Ill.: D. A. Belden, general manager, and C. C. Quakenbush, superintendent, Aurora Street Railway Co.

Atchison, Kas.: J. A. Bendure, general manager, Atchison Railway, Light and Power Co.

Bay City, Mich.: E. S. Dimmock, general manager, and W. R. Morrison, assistant general manager, Bay Cities Consolidated Railway Co.

Binghamton, N. Y.: G. Tracy Rogers, president, Binghamton Street Railroad Co.

Birmingham, Ala.: J. B. McClary, general manager, Birmingham Railway and Electric Co.

Boston, Mass.: Charles S. Sergeant, second vice-president; H. L. Wilson, auditor; J. H. Studley, Jr., and John Balch, assistant engineers, Boston Elevated Railway Co.

Bridgeport, Ct.: Andrew Radel, president, and James Butler, superintendent, Bridgeport Traction Co.

Buffalo, N. Y.: R. E. Danforth, superintendent, Buffalo Railway Co. George Chambers, superintendent, Buffalo Traction Co.

Brooklyn, N. Y.: J. H. Van der Veer, superintendent of shops; J. S. Brackenridge, chief engineer; F. H. Shepard, elevated equipment, and Giles S. Allison, sales agent, Brooklyn Heights Railroad Co.

Camden, N. J.: William S. Scull, president, and W. E. Harrington, general manager, Camden & Suburban Railway Co.

Charleston, S. C.: Nicholas S. Hill, Jr., general manager; P. J. Balaguer, auditor, and G. B. Allen, director, Charleston Consolidated Railway, Gas and Electric Co.

Chester, Pa.: Henry Moore, vice-president, and R. H. Beach, director, Chester Traction Co.

Colorado Springs, Colo.: A. L. Lawton, general manager; F. C. Lawton, superintendent, Colorado Springs Rapid Transit Railway Co.

Chicago, Ill.: E. R. Gilbert, general manager; A. E. Davies, superintendent Chicago Electric Traction Co. John McNulta, receiver; John Farson, president; H. M. Sloan, general manager; Edward H. Harrison, auditor; George H. Binkley, engineer; W. A. Harding, master mechanic and electrician, Calumet Electric Street Railway Co. Charles T. Yerkes, president; John M. Roach, general manager; John Millar, master mechanic, Chicago Consolidated Traction Co. D. G. Hamilton, president; Robert McCulloch, general manager; T. C. Penington, treasurer; F. R. Greene, secretary; G. O. Nagle, superintendent; George W. Knox, electrical engineer; A. C. Heidelberg, assistant superintendent; C. N. Duffy, auditor, Chicago City Railway Co. William Walmsley, superintendent, South Chicago City Railway Co. George A. Yuille, second vice-president; James R. Chapman, electrical engineer, Chicago Union Traction Co.

Cleveland, Ohio: Charles W. Wason, president, Cleveland, Painesville & Eastern Railroad Co. R. M. Douglass, general superintendent; John Ehrhardt, assistant secretary; Albert E. Duty, assistant superintendent, and C. B. Easty, master mechanic, Cleveland City Railway Co.

F. S. Barton, assistant secretary and treasurer; W. G. McDole, auditor; Charles W. Wason, purchasing agent; B. Maher, assistant secretary, and L. M. Wolf, assistant purchasing agent, Cleveland Electric Railway Co.

Cincinnati, Ohio: G. B Kerper, general manager; Henry Burkhold, private secretary, Cincinnati Street Railway Co.

Columbus, Ohio: P. V. Burington, auditor; J. W. McCord, Columbus Street Railway Co.

Council Bluffs, Iowa: W. S. Dimmock, general superintendent, Omaha & Council Bluffs Railway and Bridge Co.

Davenport, Iowa: F. C. Denkmann, vice-president; James F. Lardner, secretary; John F. Huntoon, general superintendent, and John D. Fish, electrician, Tri City Railway Co.

Dayton, Ohio: George B. Kerper, general manager, and Nelson Routzahn, superintendent, People's Railway Co.

Des Moines, Iowa: George B. Flippee, general manager, and J. S. Goodvell, chief engineer, Des Moines City Railway Co.

Detroit, Mich.: S. Hendric, manager; F. A. Baker, director, Detroit & Pontiac Street Railway Co.

Duluth, Minn.: Herbert Warren, general manager, Duluth Street Railway Co.

Denver, Colo: C. K. Durbin, general superintendent, Denver City Tramway Co.

Elgin, Ill.: William Grote, president; James B. Lane, vice-president; Chas. Wuestenfield, Elgin City, Carpentersville & Aurora Railway Co.

Evansville, Ind.: H. D. Moran, vice-president and general manager, Evansville Street Railway Co.

Findlay, Ohio: George B. Kerper, president; W. G. Nusbaum, engineer, and William Twining, electrician, Findlay Street Railway Co.

Gloucester, Mass.: E C. Foster, president Gloucester Street Railway Co.

Grand Rapids, Mich.: G S. Johnson, president; Benjamin S. Hanchett, Jr., assistant secretary and treasurer, Consolidated Street Railway Co.

Galveston, Tex.: F. W. Fratt, superintendent and engineer, Galveston City Railroad Co.

Hartford, Ct.: E. S. Goodrich, president; Elmer M White, cashier, Hartford Street Railway Co.

Harrisburg, Pa.: F. B. Musser, superintendent; Mason D. Pratt, engineer, Harrisburg Traction Co.

Hazleton, Pa.: E. S. Doud, secretary and treasurer; C. A. B. Houck, electrician, Lehigh Traction Co.

Houston, Tex.: H. F. MacGregor, vice-president and general manager; R. M. Johnston, stockholder, Houston Electric Street Railway Co.

Hamilton, Ont.: C. K. Green, director; J. B. Griffith, manager, Hamilton Street Railway Co.

Hamilton, Ohio: Will Christy, president; F. J. J. Sloat, general manager; C. E. Hooven, secretary; J. C. Hooven, director, Cincinnati & Hamilton Electric Street Railway Co.

Indianapolis, Ind.: Charles Remelius, superintendent motive power; John Grant, assistant general manager, Indianapolis Street Railway Co.

Venice, Ill.: Fred E. Allen, president; E. J. Spencer, secretary, Venice, Madison & Granite City Railway Co.

Jersey City, N. J.: E. D. Hibbs, auditor, North Jersey Street Railway Co.

Johnstown, Pa.: H. C. Evans, director, Johnstown Passenger Railway Co.

Joliet, Ill.: F. E. Fisher, superintendent; W. Huel, auditor; W. J. Kelsch, electrician, Joliet Street Railroad Co.

Kansas City, Mo.: Walton H. Holmes, president; J. A. Harder, auditor; William A. Sallerton, superintendent; Edward Butts, chief engineer; T. Blake, engineer; W. H. Miller, George Wing, Metropolitan Street Railway Co.

Lynn, Mass.: E. C. Foster, vice-president and general manager, Lynn & Boston Railroad Co.

London, Ont.: C. E. A. Carr, general manager and secretary; J. F. Hill, auditor, London Street Railway Co.

Lexington, Ky.: E. C. Hathaway, general manager; E. A. Longuere, engineer, Lexington Railway Co.

Louisville, Ky.: T. J. Minary, president; S. G. Boyle, secretary; J. T. Funk, C. L. Christopher, superintendent track construction, Louisville Railway Co.

Merrimac, Mass.: James T. Wattles, Haverhill & Amesbury Street Railway Co.

Meriden, Ct.: N. H. Heft, president; William Tucker, engineer, Meriden Electric Railroad Co.

Memphis, Tenn.: F. G. Jones, vice-president and general manager; C. H. Ruddock, director; W. B. Mallory, director, Memphis Street Railway Co.

Milwaukee, Wis.: John I. Beggs, general manager; H. C. Mackay, auditor; F. Sargent, consulting engineer; T. E. Mitten, general superintendent railway department; Chester P. Wilson, engineer; George Kemmerlein, superintendent of transportation; W. H. Greenslade, assistant superintendent of transportation; S. G. Mitten, superintendent of overhead construction; E. Wolds, superintendent of maintenance of rolling stock; C. H. Lemon, surgeon; T. Simmons, roadmaster; T. G. Hoffman, clerk, Milwaukee Electric Railway and Light Co.

Minneapolis, Minn.: J. F. Calderwood, auditor; F. D. Valentine, chief clerk; A. M. Baldwin, purchasing agent, Twin City Rapid Transit Railway Co.

Mexico, Mexico: Arthur S. Partridge, engineer, Compañia de Ferrocarriles del Distrito Federal de Mexico.

Montreal, Canada: Duncan McDonald, superintendent; H. A. Brown, electrician; W. A. Ross, comptroller, Montreal Street Railway Co.

New Bedford, Mass.: E. E. Potter, general superintendent; Elton S. Wilde, treasurer, Union Street Railway Co.

New York, N. Y.: H. H. Vreeland, president; A. C. Tully, purchasing agent; J. F. Kane, chief construction, Metropolitan Street Railway Co.

New Brunswick, N. J.: E. H. Radel, secretary and treasurer; John Blair MacAfee, Brunswick Traction Co.

Nashville, Tenn.: E. G. Conette, general manager; N. P. Yeatman, secretary and treasurer, Nashville Street Railway Co.

New Orleans, La.: J. K. Newman, president; George H. Davis, manager, New Orleans & Carrollton Railroad Co. C. D. Wyman, general manager; T. H. Tutwiler, engineer, New Orleans City Street Railway Co.

Omaha, Neb.: W. A. Smith, general manager; D. H. Goodrich, secretary, Omaha Street Railway Co.

Oakland, Cal.: E. A. Heron, president, Oakland Transit Co.

Portland, Me.: William R. Wood, president; William A. Wheeler, A. Whitney, directors, Portland Railroad Co. Merle R. Griffith, electrician; F. C. Boyd, director, Portland & Yarmouth Electric Railway Co.

Port Chester, N. Y.: N. H. Heft, engineer; Marion Swing, assistant engineer, Port Chester Street Railway Co.

Philadelphia, Pa.: Henry C. Moore, vice-president; J. J. Mahoney, electrical engineer, Roxborough, Chestnut Hill & Norristown Railway Co.

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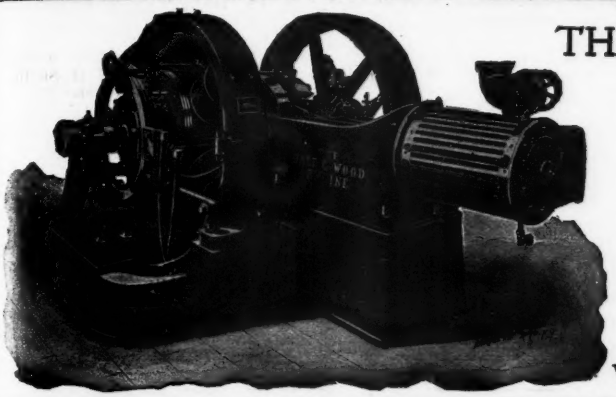

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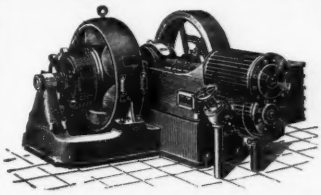

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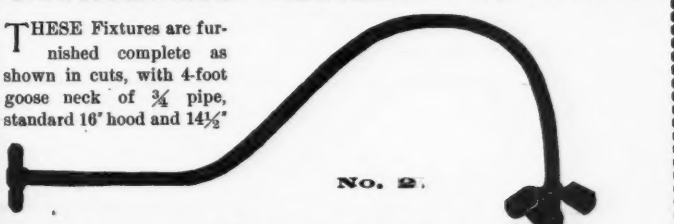

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Electrical.... Patents.

(Specially reported for this journal by E. S Duvall, solicitor of patents, Loan and Trust Building, Washington, D. C. Copies of any patent may be secured for 10 cents each.)

ISSUED OCTOBER 10, 1899.

634,816 Electric block-signal system; S. H. Hall, Buffalo, N. Y.—A one-wire main circuit actuating opposite signals at both ends of the block, magnets in said circuit for actuating said signals, energizing and deenergizing magnets for opening and closing said main circuit, and automatic means for controlling said magnets, and a contact device actuated by an approaching car or engine.

634,832 Brake and power apparatus for electrically-driven vehicles; William E. Pearson, Boston, Mass.

634,848 Device for preventing electrolysis in pipes; C. S. Courson, Springfield, Ohio—Consists of a packing having an inturned flange at one end, an interior annular groove adjacent to said flange, and one or more external annular projections therefrom.

634,849 Arc lamp; J. A. Davies, Cleveland, Ohio—In carbon-controlled mechanism in an arc lamp, the combination with a solenoid provided with upper and lower cores independently movable therein, of a clutch constructed to raise the carbon, and intermediate mechanism connecting the said cores with the said clutch, whereby both said cores work in unison to raise the carbon.

ISSUED OCTOBER 17, 1899.

634,862 Tool for electricians; J. N. Baggett, Bartow, Fla.—A tool having its handle fitted with a cap, forming a lamp-socket, provided with connected wire-tapping devices.

634,871 Switching apparatus; A. T. Brown, Syracuse, N. Y.—A switching apparatus provided with terminals formed with a series of substantially U-shaped loops, the loops of one terminal crossing the loops of another terminal at an angle.

634,903 Electric motor frame; E. C. Margan, Chicago, Ill.

634,911 Thermostat; G. F. Richardson, Hartford, Ct.

634,912 Mechanism for electrically illuminated devices; J. S. Richardson, Birmingham, England—In combination with the electric illuminating devices, means for automatically making and breaking the circuits leading thereto, a falling weight, a solenoid for lifting the weight connected in the circuit leading to the illuminated devices, a switch controlled by the movement of the weight and solenoid core for diverting the current through the solenoid.

634,932 Lightning arrester for electric circuits; H. C. Wirt, Schenectady, N. Y.—A supply circuit, a plurality of translating devices connected therewith, each translating device containing a lightning arrester bridging its terminals, and a ground branch for the circuit common to several lightning arresters.

634,933 Antiseptic and germicide attachment for telephones; A. E. Woolf, New York, N. Y.

634,937 Speed-indicator; H. W. Buck, Schenectady, N. Y.—Comprises a dynamo-electric generator, means for communicating to such generator a motion which is a function of the motion of a moving body, a source of constant counter electro-motive force, and an indicator in the generating circuit responsive to changes of voltage, but calibrated to indicate varying speeds of the body.

634,940 Combination push-button and fire-alarm; W. A. Guthrie, Durham, N. C.

634,965 Electrical measuring instrument; E. Thomson, Swampscott, Mass.

635,006 Insulated handle for electrical apparatus; J. J. Walsh, Yonkers, N. Y.

635,007 Telegraph wire joint; T. D. Wilkinson, Portland, Me.

635,008 Telephonic apparatus; G. L. Anders, London, England.

635,010 Means for testing signaling circuits; H. C. Bundy, Watertown, N. Y.—Means for testing a section of a normally closed circuit, said section having a break device and bell therein, and comprising a resistance arranged in shunt to the break device and bell, and sufficient to prevent a short circuit thereof.

635,058 Electric incandescent lamp; W. J. Phelps, Elmwood, Ill.

635,131 Electric heater; E. E. Gold, New York, N. Y.—An electric heater, comprising a minor helix of resilient resistant wire coiled into a compound helix, combined with a support consisting of a helical insulating rod extended parallel with said minor helix and exterior to the minor convolutions thereof.

635,132 635,133 Electric heater; E. E. Gold, New York, N. Y.

635,139 Regulating electric motors; M. T. A. Kubierschky, Berlin, Germany—Consists of a circuit of substantially constant potential, two sources of current of inversely variable electro-motive force means for combining said electro-motive forces, and means for impressing the resultant electro-motive force on said circuit.

635,140 Electric gas lighter; G. O. Lentschat, Cologne, Germany.

635,159 Electric meter; E. Thomson, Swampscott, Mass.—An induction watt-meter for alternating currents, comprising a current coil, a potential coil of phase displaced from that of the current coil, and two armatures upon the same shaft coacting to impart torque thereto, and respectively within the fields of the current and potential coils.

635,195 Telephone call register; J. Shannon, Buffalo, N. Y.

635,209 Antiseptic device for sound-transmitting mouthpieces; G. W. Van Alstine, Los Angeles, Cal.—A detachable cup formed of antiseptic gause and inserted into the mouthpiece to form a receptacle in the mouthpiece, with its bottom transverse said mouthpiece and forming a shield inside the same.

635,252 Electric railway; L. D. Howard, Philadelphia, Pa.

635,276 Magneto-electric machine; E. B. Cutten, Butte, Mont.

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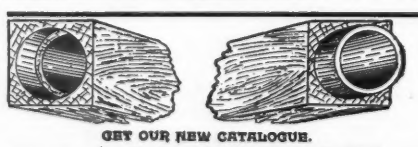

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